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THE COMMISSIONS AND SECURITIES; BARNHART'S GOOD LETTER

State utility commissions are empowered by law to pass upon the stock and bond issues that public service companies desire to offer to the investing public. After investigation the commission may either approve the proposed issue and allow its distribution, or it may withhold approval and prevent its sale.

* * * *

This is one of the most important functions of a regulatory body, as it protects the public not only from investing in unsound stocks and bonds but also from the unfair rates that the company would demand to support the ill-advised securities.

The activity in financing telephone consolidations has, in a measure, been kept within bounds by this power of the state commissions to supervise security issues. Undoubtedly this has been most fortunate. The commission that fearlessly discharges this duty is to be commended, as it safeguards both the telephone industry and the investing public, and it is to be hoped that the regulatory authorities in all states will continue to exercise vigilance in this particular.

* * * *

So far there has been only one important case in which a commission has rejected a proposed telephone security issue —this was in Indiana—but it is expected that a number of others will come up for scrutiny during the present year in states where properties are being reorganized.

Telephone men who are interested in the safe, constructive development of the industry, sincerely hope that the utility commissions will study these applications with care and see to it that the proposed security issues are framed on lines absolutely safe and sound.

The men who are in the telephone business to stay will thank the utility commission that turns down the financial program which is based on over-valuation, or which neglects depreciation requirements, or in any other particular is lacking in unquestioned soundness. They are proud of the industry and wish to remain in it.

Telephone owners do not want their business endangered by those who would exploit the industry and get away with a quick profit. For that reason telephone owners expect the utility commissions to keep close watch on proposed telephone financing in their jurisdictions and keep it within safe bounds.

* * * *

This idea is forcibly expressed in a letter which Henry A. Barnhart, president of the Indiana Telephone Association, recently sent the Indiana Public Service Commission. In this letter Mr. Barnhart enclosed for the attention of the commission, pages 17 and 18 of the March 26 issue of TELEPHONY, containing the address made before the Texas telephone convention by George W. Robinson, president of the Tri-State Telephone & Telegraph Co., in which he sounded a warning against unsafe financing.

Mr. Barnhart's appeal to the commission, which is well worth reading by all telephone men, follows:

"Let me first submit that I am not a pessimist, but when I see danger clearly defined I feel it my duty, as a factor in business welfare, to urge those in authority to guard well against the designs of speculators traveling our state buying, or proposing to buy, telephone properties and then manipulate them in financing and operation in such a way as to bring suspicion and discredit upon our business as a whole.

Therefore, please read the enclosed public remarks of one of the foremost telephone men in the United States (George W. Robinson, of St. Paul, Minn., who is thus quoted in TELEPHONY of March 26) on what is being attempted in his home state and compare it with some things of which you are aware here in Indiana.

Such tactics, if permitted, will make of our business a dangerous financial risk and create public opposition which will breed 'home rule' and municipal ownership propaganda faster than all the sound financial forces of the state can counteract.

I have recently heard public and private statements from some promoters and speculators which—if they should get to the general public—would be far more fruitful of anti-public utility propaganda than the wildest seed-sowing agitator could possibly produce.

There must be a severe check on this raid on safe business management and conservative utility control. This thing of buying run-down telephone plants at their

worth; then making appraisals at two or three times the amount paid, and boosting rates accordingly, will ruin the innocent bystander by destroying fair and intelligent control and turning it over to politicians and agitators.

With a very few exceptions, so far as I have heard, every telephone man of good judgment in our state is of the same opinion herein expressed, and I hope I may not be considered presumptuous in writing you this letter.

The public utility business and its future well being demand protection against any speculation and value-boosting craze, and it is the sincere hope of those with their own money in the business that you will feel assured of their full cooperation in any effort you make in showing the public that its interests in public utility service are not to be thrown open to gypsy horse-traders and their wiles.

If this speculative orgy is allowed to proceed, it will destroy the public utility law and financially distress every investor in utility securities who has trusted his savings in what he thought to be a safe business, which it is if fairly and honestly conducted."

* * * *

Such expressions from conservative, practical telephone men like President Barnhart should have a good effect. As stated, the law gives utility commissions authority over security issues, but they are apt to handle these questions with more care if they feel they have the cooperation of the leading men in the business.

It would help the situation materially if the telephone associations and leading operating men in all states would remind their utility commissions of their interest in such matters, urge the importance of vigilance on the part of the authorities, and also offer to support and cooperate in any move to protect the financial integrity of the industry.

Of course, it goes without saying that nothing should be permitted to interfere with financial operations, honestly planned and properly framed, to take care of the legitimate needs of the expansion of the telephone business. Such proposals speak for themselves. The individuals whom telephone men want commissions to watch are those to whom President Barnhart applies the term, "gypsy horse-traders."

COMING CONVENTIONS.

Iowa, Des Moines, Fort Des Moines Hotel, April 19, 20 and 21.

Ohio, Columbus, Neil House, April 27, 28 and 29.

Pennsylvania, Harrisburg, Penn-Harris Hotel, May 3, 4 and 5.

New York, Rochester, Powers Hotel, May 25, 26 and 27.

Wisconsin, Madison, Hotel Loraine, June 7, 8 and 9.

Demonstrate Television-Telephony

Far-Off Speakers Seen and Heard in Practical Test of Television—As Secretary Hoover in Washington, D. C., Talked to Group in New York City, Features Were Simultaneously Reproduced on Screen There Over 200 Miles Distant

Thursday, April 7, marked another milestone in the progress of communication. On that day not only was a speaker's voice transmitted over long distance telephone wires, but his features, as he spoke, were made visible to the person at the receiving end. In other words, television—"far vision"—was accomplished in connection with telephony.

Before a number of invited guests in New York City, which included business executives, editors of newspapers, national weekly and monthly magazines and technical and scientific periodicals, and engineers and scientists, the American Telephone & Telegraph Co. presented a demonstration of television between New York and Washington. This was the first public practical demonstration of television and has stirred the imaginations of people as to its possibilities.

Secretary Hoover of the Department of Commerce, General John J. Carty, vice-president of the American Telegraph & Telephone Co., Mrs. Hoover, Davis Lawrence, the well known news writer, and others in Washington, D. C., spoke over the long distance telephone to New York City. Reproduction of their voices in New York City, over 200 miles distant, was accompanied by a reproduction of their features as they talked, clearly distinguishable to the group at the New York end.

There was no television receiving apparatus at the Washington end of the line, so that the speaker at the telephone in New York was not visible to the Washington group, but every word by a Washington speaker was accompanied by a reproduction of his features at the New York end of the wire. In New York the images were received upon screens of two sizes. One was about two inches by three inches for individual use, and the other about two feet by three feet for auditorium use.

The demonstration began on Thursday afternoon at 2:15 o'clock with General Carty at the telephone before the television apparatus in Washington.

As he held the transmitter in his hand and talked, the light of an arc lamp flickered on his face. Small circles of light were moving across his face, one after another, but they were traveling at such high speed that they seemed to bathe his face in a uniform bluish light.

By a complicated process these lights were dividing his face into fine squares. Each square traveled as a telegraph signal from Washington to New York. Here, with inconceivable rapidity, the squares were assembled as a mosaic.

Each square differed in its amount of illumination. These differences of illumination traced the countenance in light and shadow and registered the least change of expression.

The squares rushed across the wire from Washington towards New York at the rate of 45,000 a second. The face was done over every 18th part of a second. About 2,500 squares—or "units," as they are called—make up each picture.

This is a brief, simplified non-technical description of the process of television about which more will be said later.

As General Carty talked his face was thus dissected by light in Washington and reconstructed on the small screen in New York. President Walter S. Gifford of the American Telephone & Telegraph Co. was on the New York end of the wire.

"How do you do, General? You are looking well," said Mr. Gifford.

The face of General Carty smiled and his voice inquired after the health of the speaker on the New York end.

"I am instructed to make a little conversation," said President Gifford, "while they are getting the loudspeaker ready. They are having a little power trouble."

"We are all ready and waiting here," said General Carty. "Mr. Hoover is here."

"You screen well, General," said Mr. Gifford. "You look more handsome over the wire."

"Does it flatter me much?" General Carty asked.

"I think it is an improvement," was the reply.

Hoover's Voice Heard; Face Seen.

Mr. Hoover was then called on to take a seat before the light which divides the features into 45,000 squares a second. A few seconds later his voice was heard over

the loudspeaker, as his face appeared on the large screen, after a short conversation with Mr. Gifford who viewed his features, as he talked with him, on the small screen.

The large illuminated transparent screen seemed somewhat corrugated. This was due to the fact that the squares which make up the picture are arranged in 50 rows, one on top of the other. In the center of the screen appeared a white glare, surrounded by darker markings.

As the eye became accustomed to looking at the screen in the darkened room, the large luminous patch took shape as the forehead of Secretary Hoover. He was leaning forward in such a way that the forehead was taking up too much of the picture, while his mouth and chin were blotted out behind the telephone transmitter. When he moved, however, the picture became clearer.

The face was easily recognizable, although the features which had been sharp and distinct on the miniature screen had become considerably blurred by the enlargement. It was plain that, enlarged to the size of an ordinary motion picture film, the detail would have been completely lost. The invention is admitted to be far from the motion picture house stage.

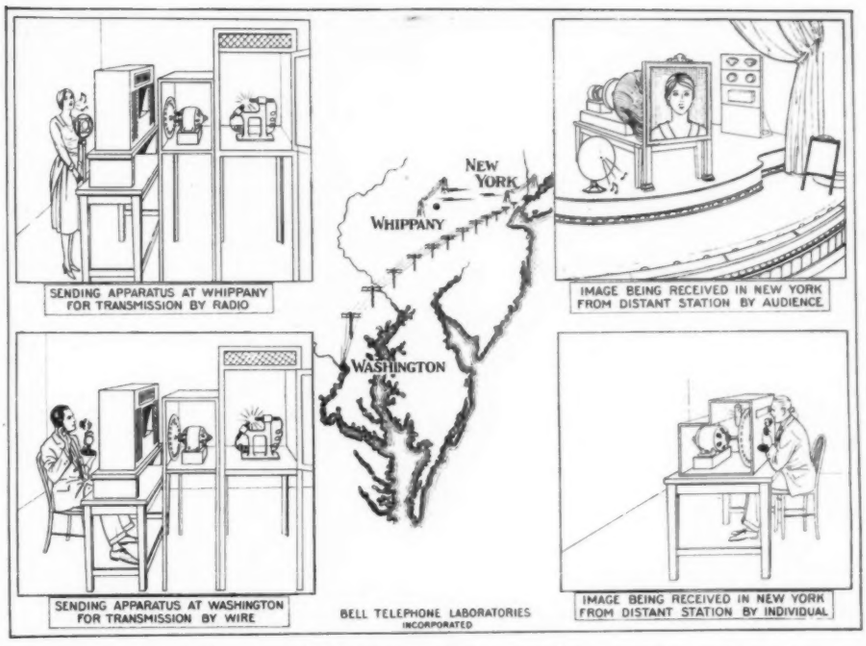

SENDING APPARATUS AT WHIPPANY FOR TRANSMISSION BY RADIO
NEW YORK
WHIPPANY
WASHINGTON
IMAGE BEING RECEIVED IN NEW YORK FROM DISTANT STATION BY AUDIENCE
SENDING APPARATUS AT WASHINGTON FOR TRANSMISSION BY WIRE
BELL TELEPHONE LABORATORIES INCORPORATED
IMAGE BEING RECEIVED IN NEW YORK FROM DISTANT STATION BY INDIVIDUAL

Diagram Illustrating Television Sending and Receiving by Radio and by Wire.

Secretary Hoover's Speech.

The face looked up from the manuscript, the lips began to move and the first television-telephone speech started:

"It is a matter of just pride to have a part in this historic occasion.

We have long been familiar with the electrical transmission of sound. Today we have, in a sense, the transmission of sight, for the first time in the world's history.

Human genius has now destroyed the impediment of distance in a new respect, and in a manner hitherto unknown. What its uses may finally be no one can tell, any more than man could foresee in past years the modern developments of the telegraph or the telephone.

All we can say today is that there has been created a marvelous agency for whatever use the future may find, with the full realization that every great and fundamental discovery of the past has been followed by use far beyond the vision of its creator.

Every school child is aware of the dramatic beginnings of the telegraph, the telephone and the radio, and this evolution in electrical communications has perhaps an importance as vital as any of these.

This invention again emphasizes a new era in approach to important scientific discovery, of which we have already within the last two months seen another great exhibit—the transatlantic telephone. It is the result, of organized, planned and definitely directed scientific research, magnificently coordinated in a cumulative group of highly skilled scientists, loyally supported by a great corporation devoted to the advancement of the art. The intricate processes of this invention could never have been developed under any conditions of isolated individual effort.

A "Dramatic" Achievement.

"The world is under obligation to the American Telephone & Telegraph Co. for its vision in the establishment and support of these laboratories, and does tribute to all those who have played their part in this development.

These laboratories have produced a long list of additions to the telephonic art and a constant contribution to other arts, but no one of them more dramatic or more impressive than this.

I always find in these occasions a great stimulation to confidence in the future. If we can be assured a flow of new and revolutionary inventions to maintain thought, stimulate spirit, and provide a thousand

President Walter S. Gifford of the American Telephone & Telegraph Co., at New York, in First Public Demonstration of Television, Sees Secretary Hoover at Washington, D. C., as He Talks with Him by Telephone—Secretary Hoover Sending His Features and Voice from Washington, D. C., to President Gifford. With Mr. Gifford Are Members of the Bell Telephone Laboratories, from Left to Right: E. P. Clifford, Vice-President; H. D. Arnold, Director of Research; E. B. Craft, Executive Vice-President; F. B. Jewett, President, and Vice-President of the American Telephone & Telegraph Co., and Dr. Herbert E. Ives, a Member of the Technical Staff. With Secretary Hoover Are, from Left to Right: Brigadier-General John J. Carty, Vice-President of the American Telephone & Telegraph Co.; A. E. Berry, President of Chesapeake & Potomac Telephone Co.; Judge Stephen Davis, Department of Commerce.

new opportunities for effort and service, we will have preserved a vital and moving community."

Mrs. Hoover took a seat before the machine which projects living pictures of the sitter and talked to Mr. Gifford.

"What will you invent next?" she said. "I hope you won't invent anything that reads our thoughts."

Half a dozen newspaper men were called to the telephone one after another to talk with men in the demonstration room at Washington. One reporter in New York talked to David Lawrence.

On the small screen Mr. Lawrence was pictured perfectly. He looked like an excellent daguerreotype which had come to life and started to talk. Even the crinkle of his hair registered perfectly. In these small motion pictures, projected by television, the detail of the face appears in clear-cut black lines against a shining gold background, due to the orange light from argon, which is used in reproducing the pictures.

As previously mentioned, the pictures were projected only one way during this demonstration—from Washington to New York. Two-way television-telephone conversations will be held later.

Demonstration Test by Wireless.

In the second part of the program the group in New York saw and heard performances in the Whippany studio of the American Telephone & Telegraph Co. by wireless. The first face flashed on the screen from Whippany, N. J., was that of E. L. Nelson, an engineer, who gave a technical description of what was taking place. Mr. Nelson had a good television face. He screened well as he talked.

Next came a vaudeville act by radio from Whippany. A. Dolan, a comedian, first appeared before the audience as a stage Irishman, with side whiskers and a broken pipe, and did a monologue in brogue. Then he made a quick change and came back in blackface with a new line of quips in negro dialect.

The loudspeaker part went over very well. It was the first vaudeville act that ever went on the air as a talking picture and in its possibilities it may be compared with the Fred Ott sneeze of more than 30 years ago, the first piece of comedy ever recorded in motion pictures.

The next number from the studio was a regular radio program piece—a short humorous dialect talk by Mrs. H. A. Frederick of Mountain Lakes.

Before and between the acts the announcer of the Whippany studio made a motion picture appearance. He was seen as well as heard.

The commercial future of television, if it has one, is thought to be largely in public entertainment—super-news reels flashed before audiences at the moment of occurrence, together with dramatic and musical acts shots on the ether waves in sound and picture at the instant they are taking place at the studio.

In the Washington part of the demonstration the telephone girl was visible. She appeared on the miniature screen and asked to whom the caller wished to talk. This one was a good-looking girl with fluffy hair, and as cool and efficient as if she had been at the television-telephone switchboard all her life.

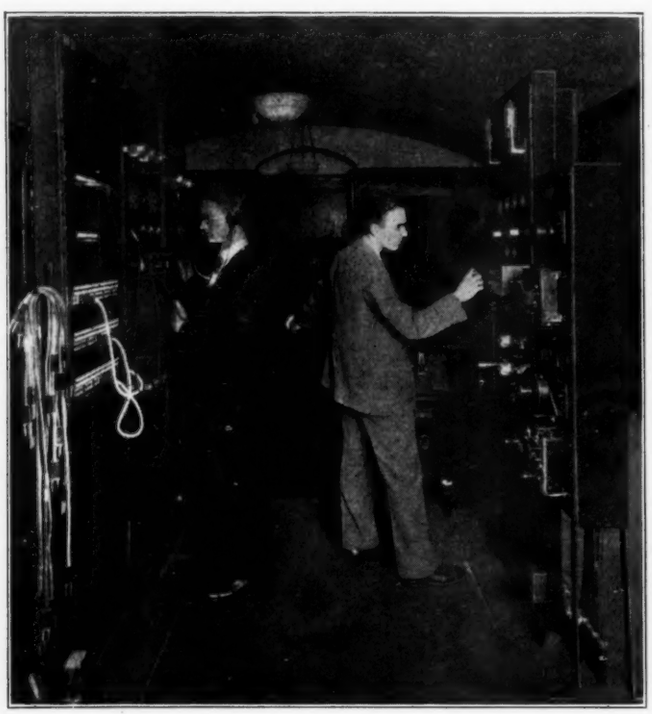
Miss Edna Horner of the Chesapeake & Potomac Telephone Co., was the one who had the distinction of being the first woman whose likeness was seen through television. She answered the New York calls as various persons present at the Washington end were requested to come to the telephone for conversation with persons in New York. Mrs. Herbert Hoover was the second woman whose likeness was so seen.

After the earlier demonstration a number of scientists were invited late in the afternoon to the Washington studio. Both Secretary and Mrs. Hoover returned with this group and the Secretary again conversed with New York.

A coincidence of the television demonstration is that "Metropolis," a German film now showing what purports to be the New York of a century or centuries hence, has a make-believe screen in connection with the telephone—a case of a prophecy being fulfilled about as soon as it started.

The demonstration of combined telephone and television, in fact, is one that outruns the imagination of all the wizards of prophecy. It is one of the few things that Leonardo da Vinci, Roger Bacon, Jules Verne and other masters of forecasting failed utterly to anticipate. Even interpreters of the Bible are having trouble in finda passage which forecasts television.

H. G. Wells did not rise to it in his



The Nerve Center of the Photoelectric Eyes of the Television Equipment Installed at Washington, Showing the High Powered Amplifiers Which Transmit the Scene to New York—Close-up of Transmitting Apparatus for Television Installed at Washington; E. F. Kingsbury of Bell Telephone Laboratories, as He Talks to the Microphone, Is Being Viewed by Three Photoelectric Eyes Located Behind the Three Screens of the Panel Immediately in Front of Him.

earlier crystal-gazing. It is only within the last few years that prophets have been busy in this field.

Science has moved ahead so rapidly in this particular line that one of the men, who played a major part in developing the television apparatus demonstrated last week was of the opinion four years ago that research on this subject was hopeless.

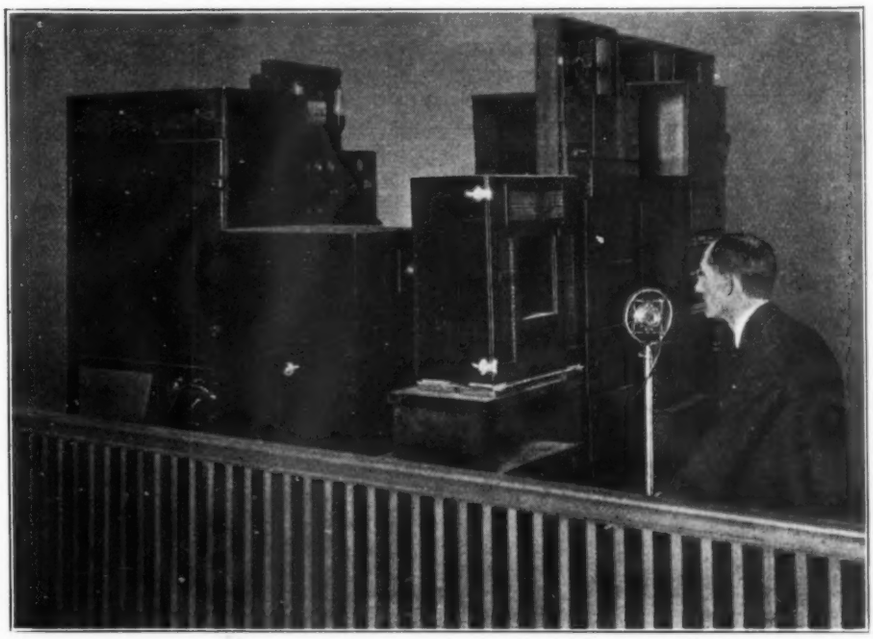
More than 30 years ago, however, Dr. Alexander Graham Bell, the inventor of the telephone, predicted at a gathering in the tower of the Times Building, New York City, that the day would come when the man at the telephone would be able to see the distant person to whom he was speaking.

The process by which television was demonstrated appears infinitely complicated and difficult on first encounter, but becomes fairly simple when traced step by step.

The thing that chiefly staggers the mind is that all that traveled over the wire from Washington to New York, or over the ether from Whippany to New York, is a series of electrical impulses.

Speed and exactitude are the tremendous achievements in the process. Dots of light are put together at the rate of 45,000 a second to form the motion pictures. Each dot has to be in its exact place. The mosaic of squares would be a jumble—the picture would be completely "pied"—if there was an error of 1/90,000 part of a second in the synchronization between the sending apparatus in Washington and the receiving apparatus in New York.

Putting aside the terrific speed, the problem seemed quite simple, as it was explained by Dr. Herbert E. Ives, who has been chief of the research work which has resulted in television.



Complete Sending Apparatus for Television Installed at Washington and Under Test Prior to the Demonstration of April 7, When Secretary Hoover in Washington Was Made Visible as Talking to President Gifford and His Guests at New York.

In telephony the transmitter is a device responsive to sound waves, from which there proceeds to the receiving equipment an electric current. The intensity of this current corresponds in its variations to the varying pressure of the sound waves and thus embodies their speech significance.

In the electrical transmission of pictures the transmitter is responsive to light waves. Its sensitive element is a photoelectric cell; and the current from it varies in intensity according to the light to which it is exposed. When this cell is exposed to light emanating from successive small areas of a picture there results a current with variations in intensity corresponding, and in similar order, to the variations in light and shade of the picture.

Reception in telephony is an operation of translating current variations into sound waves. In a telephone receiver a diaphragm is vibrated by the electromagnetic action of the varying current, and, in its movement of the adjacent air, it acts as a source of sound to emit waves similar to those which impinged upon the distant transmitter.

For the reception of pictures current variations are translated into variations of light intensity. This might be accomplished by an electro-optical action of the current, giving rise to light waves similar in intensity to those which acted on the distant photoelectric cell.

In the electrical transmission of pictures, however, translation is obtained most conveniently by varying the portion of light from a constant source which is allowed to fall upon a sensitized film. An electromagnetic action of the varying current, therefore, is employed to operate a "light valve" through which passes a narrow beam of light.

The valve varies the size of the beam in exact accordance with the current variations; and thus the sensitized film is exposed to variations in light intensity similar to those in the picture which is being transmitted. The film is moved across the beam continuously and uniformly so that its successive areas are exposed in the same order, and for the same small intervals of

Transmitting Apparatus for Television Arranged for Demonstration in the Auditorium of Bell Telephone Laboratories, New York City. Seated Before the Photoelectric Cells Which Act as Eyes Is R. C. Mathes, and Behind Him, J. W. Horton, Members of the Technical Staff Who Contributed Importantly to the Electrical Features.

time, as the corresponding elemental areas of the original picture were exposed to the beam which actuates the photoelectric cell of the transmitter.

The necessary synchronization of the mechanisms, which drive the negative at the transmitting station and the sensitized film at the receiving station, is accomplished by electrical means. For this purpose there are employed other currents, or other waves in the case of radio, which pass between the two stations and by their electromagnetic actions control the driving mechanisms and maintain them in step with each other.

In television, a series of essentially instantaneous views of a scene with action must be transmitted and reproduced at a rate, 15 or more a second, such that an observer will detect no discontinuity of action. In broad principles the method is similar to that of the electrical transmission of pictures.

A photoelectric cell, acting as an "eye," rapidly scans the scene, viewing in orderly succession each detail of it, and transmitting to the distant station a varying current, the variations of which correspond to the difference in light and shade of the successive details.

At the receiving station this current produces at each instant a spot of light of a brightness corresponding to that of the detail of the scene which the photoelectric eye was observing at the moment it originated that particular amount of current. At each instant the position of this spot of light is also caused to correspond to that of the detail of the scene. The entire scene, in successive details, is thus reproduced for an observer.

The complete process of reproducing in proper order the light details of the scene occupies less than a 15th of a second. It is then automatically repeated and thus each detail is instantaneously viewed by the observer 15 times a second. Because of physiological and psychological phenomena, however, the observer is unconscious of the series of details and apprehends the scene as a whole with continuous action.

At the sending station there is, in addition to the usual telephone desk stand, the special equipment for transmission in television. There is, first of all, a gigantic photoelectric eye, which placidly views the scene before it but receives no appreciable stimulus unless the scene is strongly illuminated.

The second portion of the equipment includes a high-powered light. The beams from this are not allowed to flood the scene and dazzle the actor. They are reduced to a narrow beam illuminating on the face of the actor a spot not more than a quarter of an inch square. This beam, guided by the so-called "scanning disk," never pauses, and sweeps the entire scene in less than a 15th of a second.

As each detail is illuminated, the photoelectric cell instantly responds, initiating a current proportional to the light reflected to it, and hence proportional to the light and shade of the particular detail. As the beam of light swings across the scene, working its way from top to bottom, the current from the cell varies correspondingly.

One Form of Receiving Apparatus for Television as Set Up in the Auditorium of Bell Telephone Laboratories, New York City, to Receive from Washington by Wire and from Whippany by Radio. The Distant Scene Is Made Visible to the Audience on the Glass Screen in the Center of the Picture. Dr. Frank Gray, Who Is Largely Responsible for That Method of Receiving, Stands at the Left, His Hand Resting on the Screen Behind Which Is the Loud-Speaking Telephone.

So swiftly does the beam sweep the scene that the current variations are wide and rapid—sometimes corresponding to a change from a maximum current to a minimum and back to a maximum in a 20th of a second. These variations, the so-called alternating-current components, are transmitted to the receiving equipment, where they are effective in reproducing the scene.

At the receiving station there is, first of all, a source of light which responds with a brilliancy corresponding to the current which is received from the transmitting station. The source is a "neon tube," a glass tube filled with rarefied neon gas and provided with electrodes; when a high potential is applied to the electrodes, there takes place a glow discharge, the brilliancy of which is exactly proportional to the potential. To obtain sufficiently high potential from the distant photoelectric cell, there are inserted in the circuit, vacuum-tube amplifiers essentially similar to those used in other operations of telephony.

The remainder of the equipment, that for synchronization, provides that the light shall appear to an observer at each instant in the same position on a picture plane as that occupied by the beam-illuminated spot of the distant scene.

For an individual observer this is accomplished by using a fairly large neon tube which glows as a whole, according to the current it receives, and revolving befor it is a disk similar in perforations to the scanning disk of the transmitting apparatus and in synchronism therewith. Although all portions of the tube have the same brilliancy at any instant, the observer sees only that portion exposed at the instant by the perforation in the synchronizing disk.

In the production of an image on a larger picture plane, a different method must be employed. Instead of a relatively small tube, successive portions of which are viewed at successive intervals, there is a very long tube folded back and forth to form a grid. Instead of a single pair of electrodes, 2,500 pairs are located along its length.

To each electrode corresponds a single elemental area of the picture plane which is scanned by the photoelectric cell of the transmitting equipment. As the current corresponding to each area reaches the receiving station, it is distributed through contacts controlled by the synchronized motors to the appropriate electrode and so causes a flash of light similar in location and in intensity. The entire grid-like tube is observed either directly or through a translucent medium. Eighteen times a second, each of its 2,500 areas shines forth with a brilliancy similar to that of a portion of the distant scene, but due to the persistence of vision the observers apprehend not a series of discrete light flashes, but a picture as a whole.

The process of television begins when the sitter takes his position in front of the sending apparatus and an arc light is turned on. Most of this light is shut off from the sitter by a disk. In the disk is a series of holes. As the disk is turned, the light strikes the sitter through the hole nearest the rim.

This spot of light travels across the top of his head. The second hole is farther from the rim of the disk. The second spot of light travels across the sitter's face, just below the first, the third just below the second, and so on. There is a total of 50 holes and 50 spots of light travel across the sitter—or the scene to be photographed—one beneath the other.

If the process could be slowed down infinitely, it would begin with the action of the visible spot of light. In practice, however, the spots move so quickly that the subject seems to be flooded by a steady illumination. There is never more than one spot of light on his face at a time, but the entire 50 spots cross the face or thing to be photographed 18 times a second.

The lines and contours and colors of the face cause variations in the brightness of the spots they reflect. These variations are turned into variations of electrical current.

Facing the sitter are three large photoelectric cells. The moving spots of light are reflected from the face or scene into these cells, where they cause electron showers. The showers are strong or weak, as the light is strong or weak.

Electron showers are nothing but electrical current, so that these cells cause a current which constantly varies according to the characteristics of the face or scene to be pictured.

This current is amplified 5,000,000,000,000,000 times before it is strong enough for the work required. Then it is sent, either by wire or radio, to the receiving television station. This current is a flying picture. Every change in volume is a feature of a scene or portrait. But the question is to make every bit of this flying picture land in the right place.

Arriving at the receiving apparatus, the current is carried to a "brush" or an electrical contact apparatus, which is mounted on a wheel.

As it revolves on this wheel, the "brush" makes and breaks electrical contact approximately 2,500 times. Each contact is made with one of 2,500 wires which are mounted on a circle in which the wheel turns.

Each wire snatches a bit of the electric current or flying picture. To each one of these wires must be delivered 18 times a second exactly the bit of the picture which is intended for it. The most minute error would scramble the portrait completely.

Each wire carries its bit of current to a square of tin foil behind the television screen. These squares of tin foil are arranged 50 in a row. There are 50 rows. When the bit of current—or fragment of picture—reaches one square of tin foil, it leaps from the tin foil to a wire.

It makes the leap through the gas called neon. This is instantaneously illuminated by the passage of electrical current through it. These tiny flashes—occurring at the rate of about 45,000 a second—build up the face on the screen.

The receiving and transmitting of the picture—that is, the taking to pieces of the picture at one place and its reassembling at another—is synchronized by a special system which causes every one of the 2,500 squares or units to fall in its proper place 18 times a second.

This control involves the use of two wires. In the case of radio television, one wave length is used for sending the picture and two for the synchronization process. Dr. Ives emphasized the difficulty arising here, in view of the congested condition of the "air."

It would take several hundred times as many dots of light a second, under equally perfect control, to make television practical on a large screen for motion-picture house purposes.

There is one big difficulty here: Television cannot be used on a larger screen without using a more powerful light on the person or object sent. The light which is now thrown on the sitter is strong enough to be uncomfortable after a short time.

Whether this factor will prove a heavy obstacle is doubtful. A more sensitive photoelectric cell may be developed which would enable television to be extended further without the use of stronger lighting.

Dr. Ives called the human eye "a television system." Instead of having only 2,500 wires, the eye has more than a million nerve fibers which carry light impulses to the brain.

As in motion pictures, it is the phenomena of "persistence of vision" which causes the flickering squares of light to fuse together so that the eye sees them as objects in motion. Motion pictures really consists of still pictures shown at the rate of 18 per second. The eye blends the stills into motion.

In television, the eye is even more deceived. Here there is only a series of spots of light flashing on and off, but each spot maintains its effect on the human eye long enough for the brain to comprehend them as an organized picture.

In one form of the receiving apparatus the observer looks through a rectangular aperture, about 2 inches by 2½ inches; and through this he sees the scene which is viewed by the distant transmitting apparatus. In another form of receiving apparatus, which was developed for observation by an audience instead of by a single person, the observers look at a glass screen on which is reproduced, instant by instant, what is taking place befor the distant transmitting apparatus.

Before the Actual Demonstration of Television from Washington, D. C., and Whippany, N. J., to New York, Dr. Herbert E. Ives Explained to the Guests of the American Telephone & Telegraph Co. in New York City the Principles of Operation in Television. In His Hand Is One of the Giant Photoelectric Cells, Which Serve as Eyes in Television. Behind Him at the Right Is the Large Neon Tube Which Re-Creates for an Audience the Distant Scene. On the Left Is the "Scanning" Apparatus.

The achievement of an operative system for television is the result of a series of researches and apparatus developments planned and conducted by Dr. Herbert E. Ives, assisted by Dr. Frank Gray, H. M. Stoller and other members of the technical staff of Bell Telephone Laboratories.

The Bell Telephone Laboratories have been directed to concentrate on developing television with all possible speed; the order is marked "condition for commerce." How long it will take before this order is filled engineers refused to prophesy, but admitted they had a big job ahead of them.

One of the serious problems in perfecting the invention for general commercial use is that of cost. Nearly 1,000 men were used in the demonstration on April 7, when Secretary Hoover in Washington was seen and heard in New York.

Discussing the future possibilities of television at the demonstration April 7, President Gifford said:

"I'll have to leave that to your imagination."

Dr. Frank B. Jewett, vice-president of the American Telephone & Telegraph Co., said that television was farther advanced now than transoceanic telephony was in 1915 when the company held its first successful radio telephone tests from Washington to Paris and Honolulu. Eleven years of development followed that first test in 1915 before transatlantic telephony was placed on a commercial basis.

The television demonstration of April 7 is far in advance of anything that is claimed for any other invention in the same field. John L. Baird, a young British

inventor, has been considered the leader in television research, but his work is alleged to be crude, in comparison with the Bell system.

The Alexanderson television project is still in the laboratory, having never been given any public demonstration, and most other television systems are in the talking stage.

Mr. Baird claims to have established television between London and New York. He proposes to give a wireless telephone-television demonstration between London and a New York store shortly, a special receiving set having been built for the purpose.

Mr. Baird said that for several weeks he carried on his experiments between his station at Coulsdon, Eng., and a station 25 miles outside of New York. A new station is being installed in this country by means of which Mr. Baird says it will be possible to demonstrate the practicability of his invention.

If these tests are successful, Television Ltd., the company of which he is technical director, it is said, will place a television receiving set on the market at a cost of $150.

Although many experiments in television have been made in Great Britain, engineers of the General Postoffice are not cooperating with the scientists on both sides of the Atlantic who are trying to bring this new development within reach of the public. A British Postoffice official, questioned on the subject, replied: "There is much to be done before the Postoffice aims at a public service of television."

Children May Be Educated to Telephone Properly.

The National Education Association's commission on the course of study, through a sub-committee headed by Dr. E. C. Broome, superintendent of Philadelphia's public schools, has recently submitted a report which, if adopted and carried out, will help to make the children who are now beginning to go to school a generation of pleasant talkers over the telephone.

A number of suggestions for conversation over the telephone have been made in the section on language and composition which the sub-committee has prepared. These have to do with elementary instruction as to clearness of enunciation, deliberate speech and the maintenance of low tones. Among others, the following directions are given:

"Be considerate in the use of the telephone."

"Avoid calling during meal times, at extremely late or early hours, or at heavy business hours."

"Also avoid using other people's telephones often, or for too long a time."

The Philadelphia Record points out that this is splendid advice as far as it goes, but that it does not go far enough.

It refers particularly to the numberless offences committed over the telephone, some of them by supposedly intelligent, big business men, as, for example, when one instructs his stenographer to call Mr. A. Then when Mr. A. answers, he is kept waiting with the receiver to his ear until the secretary's employer, Mr. B., is ready to talk to him.

The newspaper further urges the need for postgraduate lessons in telephone etiquette among men and women in the business world, although it points out that women do not offend as often as do the men. It adds that an even-tempered young woman at the telephone exchange desk of any corporation is an immensely valuable asset to that establishment.

QUIETNESS IN OPERATING ROOMS

By Miss Anne Barnes,

Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines, Iowa

As I travel about from office to office, naturally I meet a variety of operating conditions. The one thing which impresses me the most favorably is quietness, because I know that quietness is one of the offsprings of good organization.

The effect that quietness has on the operating force is of untold value; and its reactionary effect on the public, our customer, doubles that value.

One of the main causes for noisy operating rooms is the incorrect speaking of operators. Little attention appears to be given the value of well modulated voices. Operators' voices are their company's carriers of service. What they carry across space to the subscriber's station, forms his impression of the commodity we sell.

Incorrect speaking is the result of lack of training in a better, more effective use of the voice. This training, if properly handled, results in operators speaking with a more moderate use of the voice without reducing distinctness in enunciation or voice volume.

The advantages gained will be: less repetition from misunderstanding; less nervousness and irritation; better concentration, and a favorable impression of our service on the public. Surely this is worth while.

In order to speak most effectively, operators must be taught to wear their telephone sets correctly. Transmitters must be adjusted so that they are close to the lips in order that operators may speak directly into them. Telephone sets should be checked occasionally to determine their condition. Chief operators should not wait for operators to report their sets as not in good condition.

It seems to me that there is, generally, a great deal of unnecessary noise from trivial things in operating rooms.

I have frequently been asked: "What can we do to make our operating rooms more quiet?" Here is a list of a few of these trivial conditions, some or all of which I find existing in most operating rooms:

1. Loud speaking by operators to their subscribers.
2. Loud speaking by desk employes.
3. Loud speaking by executives.
4. Operators entering and leaving room noisily.
5. Snapping keys, and calculagraph levers.
6. Handling cords noisily.
7. Unnecessary moving of chairs.
8. Opening and closing desk and windows.
9. Raising and lowering curtains.
10. Slapping curtains.
11. Dropping books and pencils.
12. Turning pages noisily.

I have thought of asking as many chief operators and head operators who care to do so, to start a campaign on obtaining "Quietness in Operating Room." I shall be glad to have anyone write to me, care of TELEPHONY, and tell me what you are doing and accomplishing in this direction.

Police of Los Angeles, Cal., Must Have Telephones.

All of the police officers in the city of Los Angeles, Calif., have been ordered either to have telephones installed in their homes or to furnish telephone numbers at which they may be reached day or night.

The order states that officers with their present salaries can afford telephone service, and it is a desire of the department to be able to keep in touch with such officers at all times.

Kansas Men Consider Many Matters

Annual Convention of Kansas Independent Telephone Association Discusses Many Topics and Problems—Speculation in Telephone Properties Through Unsafe Financing Methods Denounced in Resolution—Resume of Proceedings

By Willard Welsh

Keeping the telephone business in the hands of telephone men, who have the interests of their subscribers at heart, instead of allowing it to become the plaything of unscrupulous promoters was the keynote of the 27th annual convention of the Kansas Independent Telephone Association. It was embodied in a resolution which was passed at the closing session of the convention.

Starting on the morning of April 5 at Manhattan, the convention continued until noon on April 7. The program was filled with informative speeches on subjects of interest to telephone men. The sessions were attended by more than 400 representatives of the Independent telephone companies in Kansas. The meetings were held at the Manhattan community house.

T. L. Youmans, of Osawatomie, was re-elected president of the association at the closing session of the convention. The other officers chosen for the coming year are: Samuel Tucker, Pleasanton, first vice-president; Fred Scoresboy, Sterling, second vice-president; J. A. McDonald, La Harpe, third vice-president; V. E. Chaney, Kansas City, treasurer; Miss M. J. Hancock, Kansas City, assistant treasurer; and L. M. Kraege, Topeka, secretary.

Secretary L. M. Kraege, Topeka, Kans., Is Constantly on Lookout to Assist the Members of Kansas Independent Telephone Association.

The newly-chosen executive committee is composed of Samuel Tucker, Pleasonton; Fred Coulson, Abilene; C. C. Raymond, Greensburg; J. A. Gustafson, Fredonia; J. H. Campbell, Baldwin; E. C. Blomeyer, Kansas City; Foster Lamming, Tonganoxie; R. B. Fegan, Junction City and W. P. Lambertson, Fairview. Four membership secretaries were elected. They are H. J. Clark, Ashland; E. L. Boyle, Independence; E. C. Umdenstock, Osage City; and Elliott Belden, Abilene.

A feature of the convention was the dedication of the new exchange of the United Telephone Co. at Manhattan. This exchange, which was the second one in Kansas to have the dial equipment, is located in a very impressive building of Aztec design with a beautiful architectural style.

It is a three-story structure, modern in every detail. The front is finished in buff pressed brick, trimmed with Bedford stone. On the facade are four emblems typical of Kansas—Indian head, Swastika, Buffalo and Sunflower. The building was completed on May 29, 1926, when the dial system was put in service.

T. L. Youmans, president of the Kansas Independent Telephone Association, gave the dedicatory address in which he complimented the officials of the United Telephone Co. on the progressive spirit which they have shown by the installation of service-bettering facilities.

Harry Wareham, vice-president of the United Telephone Co. who, with Charles Wood, started the first telephone exchange at Manhattan, christened the new building by pouring on the cornerstone liquid contents of a bottle which smelled of the old pre-Volstead days.

The convention was called to order on Tuesday afternoon, April 5, by President Youmans, who expressed his appreciation for the splendid support which he had received from the membership during the past year. He then introduced S. A. Bardwell, president of the Manhattan Chamber of Commerce who made the welcoming address.

Fred Coulson, from Abilene, assistant general manager of the United Telephone Co., who is a member of the executive committee of the association, responded to the address of welcome. Mr. Coulson outlined in a brief and interesting manner the progress which has been made by the telephone industry during the past 50 years.

"The telephone industry has been given the best advertising and publicity of any public utility in the United States," declared H. W. Davis, professor of English at the Kansas State Agricultural College, in his speech at the convention. "But the public's impression of a telephone company is influenced just as much by the speech and action of the employes as it is by advertising and publicity."

Professor Davis explained in an interesting way that, while advertising and publicity can be of real benefit, they must be backed up by a real spirit of service throughout the telephone company's organization.

T. L. Youmans, of Osawatomie, Kans., Re-elected President of the Kansas Independent Telephone Association, Is One of the Veteran State Association Presidents.

Miss Anne Barnes, special traffic representative of the United States Independent Telephone association from Des Moines, Iowa, spoke interestingly on the subject of "Coordination Between Commercial, Traffic and Plant Departments of a Telephone Company." She brought out the fact that a company cannot be stronger than its weakest department, and emphasized the need of loyal cooperation between every member of a telephone organization.

Samuel Tucker, of Pleasanton, Kans., made a practical talk on the value of expert engineering advice to a small telephone plant. His speech was based on his own experience in completely rebuilding his own telephone plant.

"Expert engineering aid is just as necessary for telephone construction work as the service of an architect for other build-

ing activities," declared Mr. Tucker. "A thorough investigation is always necessary before rebuilding work is started."

The special traffic school for operators, which was held during the convention, was very successful. More than 80 operators, sent to the convention by Independent telephone companies, benefited by the course which was given at the Manhattan exchange under the direction of Ralph Van Trine, traffic superintendent of the United Telephone Co.

J. A. Gustafson, from Fredonia, a member of the executive committee of the association, told of his experiences in handling program service. The difficulties of that service were brought out by B. H. Piepmeier, engineer from Kansas City, who is connected with Diversified Investments, Inc.

A pleasant interval in the forenoon session of the convention program on the second day was enjoyed when a male quartette composed of United Telephone Co. employes from the general offices of the company at Abilene sang several snappy selections. Clever parodies on prominent Kansas telephone men were worked into the songs. The quartette was composed of H. E. Buchanan, Dan Ballore, Eddie Kincaid and Marion Weller.

C. W. Motter, publicity director for the Lincoln Telephone & Telegraph Co. of Lincoln, Neb., in one of the principal speeches of the convention, stressed the particular importance of teaching every telephone employe as much as possible about the telephone business.

Public relations of telephone companies, according to Mr. Motter, depend upon the intelligent service rendered by telephone employes. There are one-half million telephone employes in the United States. If each of them would cultivate the confidence of his friends in the telephone business, the industry would be completely sold to the public.

R. A. Seaton, dean of the division of engineering of the Kansas State Agricultural college, told of the work which the college is doing in training engineers. He explained that many graduates of the school are now in the employ of the Bell system in Kansas City and St. Louis.

"Politics and public utilities should be kept separate," declared J. T. Anderson, associate professor of economics at the Kansas State Agricultural College, in his address. "There are several reasons why public utilities must be regulated. They provide the necessities of life and are what the economist calls natural monopolies."

Theory, operation and economics of the telephone industry are to be taught in a short course for telephone men at the Kansas State Agricultural College this spring, according to Prof. R. G. Kloffler of the department of electrical engineering at the college, in his talk concerning the college work.

Ralph Van Trine, Traffic Superintendent of United Telephone Co., Abilene, Kans., Conducted the Traffic School Held During the Kansas Convention at Manhattan.

C. L. Brown, president of the United Companies of Abilene, who is one of the pioneer telephone men of Kansas, gave an address describing conditions in Europe as he found them last summer. He declared that America has nothing to fear from Europe industrially.

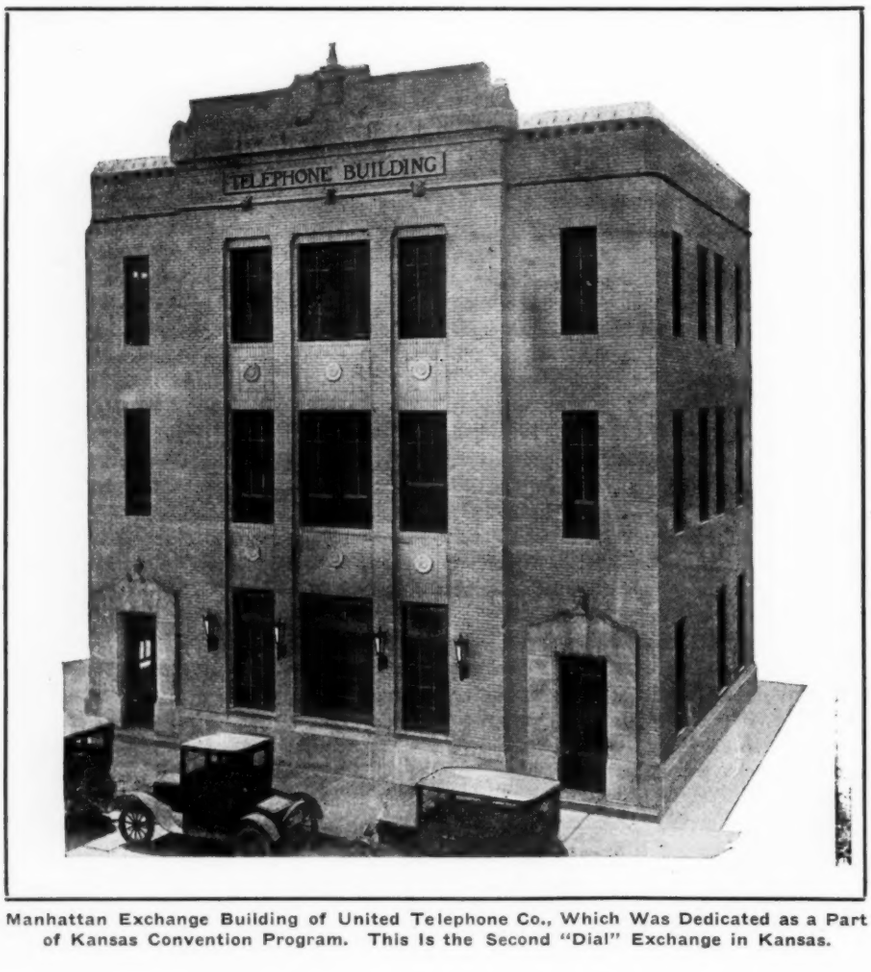
L. T. Hussey, chairman of the Kansas Public Service Commission, pledged the cooperation of the commission in every way possible. He stated that there are now 363,000 telephones in Kansas; and of that number, 170,383 are owned by Independent telephone companies.

First aid demonstrations given by employes of the United Companies were a feature of the second day's program. They went through the prone pressure method of resuscitation and various types of first aid bandaging.

The men who took part in the demonstrations were: Geo. Cartwright, Harold Childs and A. C. Burgess of the United Telephone Co.; Smith Stiles and Jack Colburn of the United Power & Light Corp.

A big banquet and dance on the evening of April 6, were features of the entertainment program at the convention. F. D. Farrell, president of the Kansas State Agricultural College, was the principal speaker at the banquet. His speech was of an inspirational nature. He cautioned the telephone men against forgetting the finer things of life in this industrial age.

A little playlet entitled "As It Used to Be and As It is Today," was presented at the banquet by several operators of the Manhattan exchange. They first illustrated the gum-chewing inefficient telephone oper-



Manhattan Exchange Building of United Telephone Co., Which Was Dedicated as a Part of Kansas Convention Program. This Is the Second "Dial" Exchange in Kansas.

ators of the past and then showed, in comparison, the methods in use today.

After the banquet program, the telephone men and their wives and friends enjoyed a dance.

Chas. C. Deering, Des Moines, Iowa, secretary of the United States Independent Telephone Association, made his speech on the last day of the convention. He told about the splendid results which the association has secured through the use of the correspondence course for operators. This was put out last summer and is available for all operators of member companies.

H. M. Cox, a representative of Diversified Investments, Inc., of Kansas City, gave a talk on the way managers can help themselves by systematizing their work.

Dr. J. S. Hughes, professor of chemistry at the Kansas State Agricultural College, delivered a lecture on "Sunshine and Health."

This resolution was unanimously adopted on the closing session of the convention.

"Whereas, the telephone industry has long had a safe and conservative financing policy which has won public favor; and

Whereas, recently in other states promoters have entered the telephone field and have offered the public bonds and other evidences of indebtedness issued against inflated valuations and without due provision for all the proper expenses necessary to maintain and operate the property so as to render and to continue to render adequate service to the public, and particularly without adequate provision for the inevitable depreciation of such property.

Now Therefore Be It Resolved:

First, that we deplore the advent of any element of speculation in the telephone business.

Second, that we call the attention of the investing public to the inherent stability of the industry.

Third, that we point out the necessity for careful scrutiny of the financial set up of companies whose securities are offered for sale in order to determine:

(a) That the evidences of indebtedness have a real margin of security.

(b) That the expenses allowed are sufficient to maintain and operate the property in a high degree of efficiency and particularly to provide for the losses due to depreciation, including wear, obsolescence and inadequacy.

(c) That we call the attention of the public to the fact that they are able at all times to secure information from our public service commission as to the stability of any telephone bond issue in Kansas.

Convention delegates were presented with "Talk Home" tickets by the United Telephone Co. These tickets bestowed the privilege of making a free long distance call from Manhattan to any point in Kansas, Oklahoma, Missouri, Nebraska or Iowa during the convention.

Special telephone equipment displays containing the latest inventions of telephone mechanism were on exhibition during the convention. Companies which had displays were: Union Electric Co., Stromberg-Carlson Telephone Mfg. Co., Graybar Electric Co., Cook Electric Co., Automatic Electric, Inc., American Electric Co., Inc., and Kellogg Switchboard & Supply Co.

Interesting Program for Iowa Convention at Des Moines.

The convention of the Iowa State Independent Telephone Association, to be held April 19, 20 and 21 at the Fort Des Moines Hotel, Des Moines, promises to be unusually interesting and well attended.

Charles C. Deering, secretary-treasurer of the association, has announced the program which, while not having many set addresses, provides for discussions of matters in which Iowa people are much interested at the present time.

Registration and a meeting of the directors will be held Tuesday morning, April 19 and the first session will convene in the afternoon. The program in full follows:

TUESDAY, APRIL 19, 2:00 P. M.

Invocation, by Rev. Roy H. Brown, Central Presbyterian Church.

Address of Welcome, by Mayor Fred Hunter.

Response to Address of Welcome, by W. H. Fowler, Pella.

Secretary-Treasurer's Report, by Chas. C. Deering, Des Moines.

President's Address, F. G. Moore, Washington.

Address, relating to substitutes for paper, wood and silk from corn stalks and corn cobs, by Prof. O. R. Sweeney, Iowa State College, Ames.

WEDNESDAY, APRIL 20, 10:00 A. M.

Skit—"Past, Present and Future of the Telephone," by Miss Anne Barnes and assistants.

Address by Thorne Browne, Omaha, Neb., former chairman of Nebraska Railway Commission.

"Radio Program Service—A Revenue Producer," by E. D. Glandon, Pittsfield, Ill.

Convention photograph.

WEDNESDAY, 2:00 P. M.

"Problems of Small Companies," by J. C. Crowley, Jr., secretary, Minnesota Telephone Association, St. Paul, Minn.

Address by F. B. MacKinnon, president, United States Independent Telephone Association, Chicago.

Election of officers.

WEDNESDAY, 6:30 P. M.

Traditional banquet.

Entertainment de luxe

Dancing.

THURSDAY, APRIL 21, 10:00 A. M.

Committee reports.

"The Effect on the Industry of the Unusual Activities, Sales and Mergers, Which Have Taken Place," by J. M. Plaister, Ft. Dodge.

Open Forum, with Perry C. Holdoegel, presiding.

Discussion of sales and mergers, and of any problem or question.

Discussion will include:

Small Exchange, Maintenance, Free Service Problems. Handling Information Requested by Officials Such as Sheriff. Collections. Depreciation Rates for Small Companies. Franchise Requirements.

THURSDAY, 2:00 P. M.

Continuation of Open Forum.

Program for Operators' Conference.

WEDNESDAY, APRIL 20, 10:00 A. M.

"The Spirit of Service," by J. R. Denkhoff, Dyersville.

Discussion of the C.-L.-R. Method.

WEDNESDAY, 2:00 P. M.

"Thrift," by Miss Grace Coan, Denison.

Explanation of Transatlantic Telephone Service.

THURSDAY, APRIL 21, 9:30 A. M.

"Our Service Is What We Make It," by Miss Bess Peterson, Marshalltown.

Discussion of Local Operating Problems and Management.

Discussion of Standard Switchboard Markings and Designation Strips.

THURSDAY, 2:00 P. M.

"Public Relations," by Miss Margaret Grace, Ft. Dodge.

Discussion of Need for Cooperation Between Employes and Between Departments.

Hour Added to Daily Service Period for Transoceanic Calls.

Effective Sunday, April 10, the period during which service is available for telephone calls to London and other points in England, Scotland and Wales was extended one hour. The service opens at 7:30 a. m., New York time, instead of 8:30 a. m., as heretofore. There is no change in the closing hour, which is 1 p. m.

It is also announced that this time for the opening of service will prevail after daylight saving time becomes effective in New York, on April 24, service being available after that date from 7:30 a. m. to 1 p. m., New York daylight saving time.

Illinois Association Issues Chart of Computed Toll Charges.

In connection with the recently revised toll rates which have been placed in effect on almost all of the principal long distance and toll circuits of Illinois, the Illinois Telephone Association has prepared a chart of computed toll charges which is extremely useful to the operators on toll positions.

These charts will be furnished without charge to member companies, and to non-member companies at a price of 15 cents each. They will pay for themselves many times over in the first month of use by the saving in time.

Ridgway Network Now Automatic

Three Exchanges of Home Telephone Co., of Ridgeway, Pa., forming "Free Toll" Network Converted to Strowger Automatic Operation—Single Independent Company Result of Consolidation of Bell and Independent Plants

By H. E. Clapham,

Publicity Manager, Automatic Electric Inc.

To many telephone men the successful extraction of profit from small telephone exchanges is still something of a mystery, the solution of which demands the executive genius and financial acumen that is usually considered to be the exclusive property of "big business."

Now John H. Wright, who is president of the Jamestown (N. Y.) Telephone Corp. and who is also associated with a number of other telephone operating properties in eastern Pennsylvania, has never laid claim to any particular degree of vision in his dealings with a fickle public. We are inclined to think that Mr. Wright is a little over-modest in this.

Nevertheless, his remarkable success in keeping his telephone subscribers satisfied and still making money at the game, is the result of a very simple formula, which, briefly described, is simply this:

First, find out exactly what the conditions of service in the community in question are; second, determine what the telephone users of the community ought to have in order to rectify these conditions; third, sell the remedy to the telephone-users so thoroughly that they will be more than glad to pay whatever additional charges the improvements may necessitate.

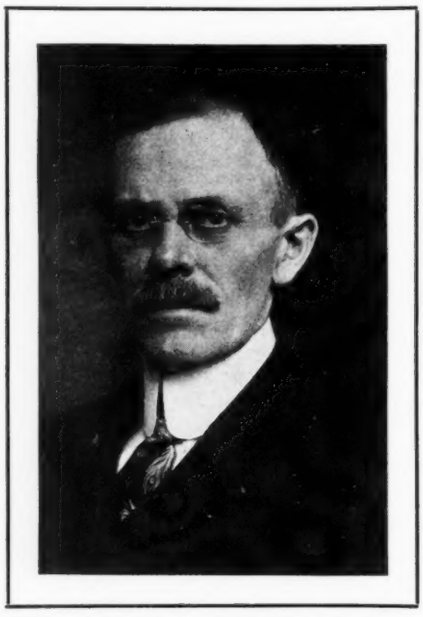
This procedure is apparently so simple that one might be tempted to doubt its practicability were it not for the fact that it has been proved sound time and again in the operation of the properties with which Mr. Wright is associated.

For example, a little more than a year ago, at Butler, Pa., where the telephone service is administered by the People's Telephone Corp., one of the enterprises of which Mr. Wright is head, it was found necessary to replace the central equipment. Before doing this, however, it was found necessary to justify this expenditure by increasing the rates to Butler telephone users. This met with surprisingly little objection, and the installation was made.

The satisfaction of the telephone subscribers of Butler since the date of conversion has been a favorite topic for discussion among Pennsylvania telephone men. It is quite evident that, having once experienced the convenience of dial operation, Butler telephone users would not now care to return to the former type of service at any cost.

The latest field of Mr. Wright's activity has been a group of small industrial towns nestling in the Pennsylvania hills about 100 miles northeast of Pittsburgh. Of these, Ridgway, St. Mary's and Johnsonburg were converted to Strowger automatic operation on Thursday, March 31. This conversion was the culmination of an extensive development program which was begun many months ago.

The history back of the installation of



John H. Wright, of Jamestown, N. Y., is President of the Home Telephone Co., of Ridgway, Pa.

Strowger automatic equipment in these three exchanges is of unusual interest since it serves to emphasize the success which usually comes from the frank discussion of telephone problems with the public.

When Mr. Wright organized the Home Telephone Co. for the purchase of the telephone property of the Commercial Union Telephone Co., which operated the exchanges in this neighborhood up to some 18 months ago, telephone conditions in these places were far from perfect.

Each of the three towns mentioned was served by two exchanges, one Independent and one Bell. Competition of this kind is inefficient at the best, but where the equipment is out of date and inadequate, as it was in these communities, troubles multiply rapidly.

In making his preliminary investigation, Mr. Wright decided that the first thing necessary was unification; the second, rehabilitation. This naturally necessitated a considerable outlay of money, much more than could possibly be justified by the existing rates which the telephone subscribers were paying.

How to give the telephone-users in these three towns a high grade of telephone service at rates profitable to the telephone company was the problem which had to be solved by the new company.

The manufacturers of Strowger automatic equipment became aware of the situation existing in this community, and at once proposed the use of automatic equipment. Mr. Wright's experience with automatic service at Butler naturally caused him to favor such a change as far as pleasing the public was concerned. He however, had some hesitation in adopting automatic equipment because of the relative smallness of the switchboard, but finally consented to consider a proposal of the installation of automatic telephones. As soon as figures as to costs were available, he placed the entire proposal before the telephone-users of both systems in each city.

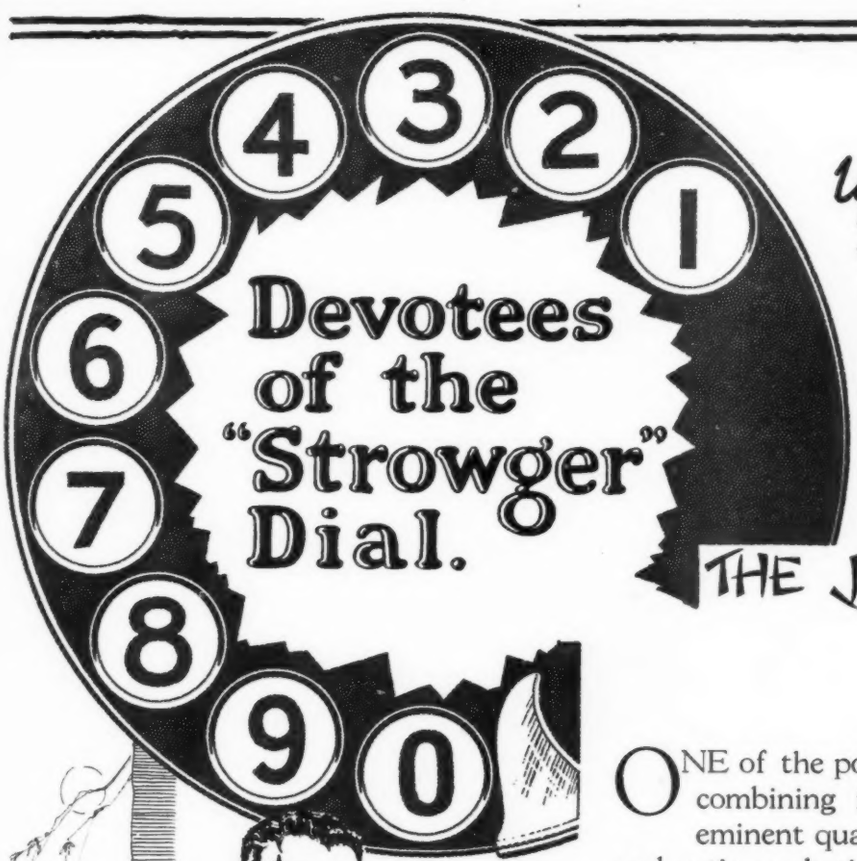
In asking the telephone-users to favor or oppose the merger, Mr. Wright submitted a new schedule of rates which would be high enough to justify the installation of automatic service for all three cities, and at the same time permit a limited amount of free long distance service between exchanges. The proposition resulted in an overwhelming vote for the proposed new service and steps were taken at once towards the purchase of the Bell interests and the rehabilitation of the entire telephone system in each city.

As soon as the traffic data and other engineering details were available, specifications were drawn up for automatic switchboards, and manufacture of the central office equipment was begun. At the same time, new telephone buildings were erected and preparations were made for the physical merger of the competitive cable plants in each city. This work of preparation and engineering development was placed in the hands of Lloyd C. Wright, to whose untiring effort the subsequent success of the installation was largely due.

The transfer of service, which took place on March 31 of this year, was fully successful, and the telephone-users of those towns are now using the dial as freely and naturally as if they had been accustomed to automatic telephone service for many years.

Because of the unusual nature of this

(*Continued on page 29.*)



Devotees of the "Strowger" Dial.

Upwards of 3,500,000 Strowger Automatic Telephones installed or under construction throughout the World

THE JAPANESE

ONE of the politest nations of the world, combining in a marked degree such eminent qualities as frugality, industry and patience, besides courage of a high order and burning patriotism, history proves that the Japanese have shown themselves capable of great things.

Overcoming many barriers they have revealed a determination for modern methods in all the arts, commerce and industry, and "Strowger" welcomes its recent adoption as the future Automatic telephone system for the principal cities including Tokyo, the capital, with a population of 2,000,000 people.

"ATM Reg." Strowger

AUTOMATIC TELEPHONE MANUFACTURING COMPANY, LTD.
STROWGER WORKS :: :: :: :: MILTON ROAD, EDGE LANE, LIVERPOOL

Associated Company
INTERNATIONAL AUTOMATIC TELEPHONE CO., LTD., LONDON

When writing to Automatic Telephone Mfg. Co., Ltd., please mention TELEPHONY.

The Monophone — a profit

Mono

The Monophone is manufactured in the types shown here, both with and without dials, and can be furnished for any type of common battery service. The manual desk stand has a center type stem while the automatic style is designed with offset stem. Dial blanks may be substituted for dials where automatic operation is to be adopted in the near future.

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Desk Set
Type 2

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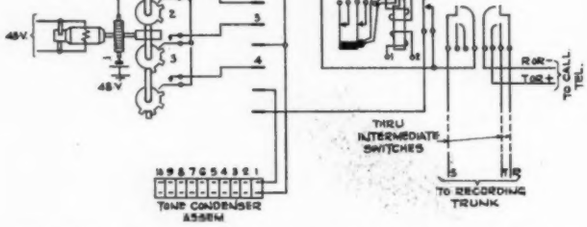
"Class of Service" Tones for Strowger Automatic Systems

by C. J. DIEHL
Power Engineer, Automatic Electric Inc.

Stowger Automatic Telephone systems, in addition to being normally equipped to give the usual informatory signals, such as dial tone, ringing tone and busy tone, to any person seeking to establish a telephone connection, can also be arranged to give other special signals. Since it is often desirable for the manual operator to discern what service restrictions affect a call originating from a telephone, provision can be made when required for what is known as "class of service tones," or, as they are sometimes termed, "discriminating tones."

The signal which the operator receives when a call is initiated from a telephone to which a class of service tone has been assigned, consists of a number of impulses of a high-pitched tone. These impulses are arranged to give four different codes, thus making it possible to have as many as four definite restrictions which are readily discernible by the recording operator.

The principal uses that are made of class of service tones are to apprise the toll recording operator, when a toll connection is requested from a coin box or pay station telephone, so that the operator can collect the proper fee before the call is completed; or when the call is from any other telephone which for some reason is denied toll service, so she can advise the calling party that no toll calls can be accepted from that telephone.



The line switch equipment associated with the pay station line is usually connected to a tone having a continuously interrupted code which is heard by the operator as a series of vibratory clicks occurring at regular intervals.

The lines switch equipment associated with "denied toll" telephones is usually connected to a tone having a code consisting of two interruptions occurring quite close together and having a considerable silent period between each successive group of interruptions or clicks.

The codes of three and four interruptions, when provided, are ordinarily used for special service, such as calling the operator's attention to calls originating from a party line on which one of the subscribers has made persistent complaints of erroneous charges for toll service, in order that she may check all calls originating from this line for a period of time by re-calling the telephone number given by the subscriber; and also for restricting toll service from stations where the subscriber desires personal confirmation on all originating toll calls, etc.

The apparatus required to produce these results is as follows:

(a) A duplicate set of motor driven interrupters for producing the tones. This equipment is common to the office.

(b) A .02 M.F. condenser for each line to be restricted when rotary type line switchboards are employed, or a .02 M.F. condenser and an extra pair of springs per line when plunger type line switches are employed. This apparatus is required for connecting the tone to the line switch release lead.

(c) Properly designed toll recording trunks. This trunk equipment is arranged to extend the tones through from the lines to the toll recording operator's position and is also arranged so that the tones may be removed from the trunk by the momentary operation of a tone removal key.

The tone machines are usually mounted by means of brackets on the front of the power board and are protected from dust and mechanical injury by suitable covers. The motor is designed to operate on a 48 volt battery, and the necessary switches, induction coils and fuses associated with these machines are located on the same panel with the machines.

The .02 M.F. condensers are furnished in units of 10 per can and are mounted on the line switch uprights. The extra springs, when plunger type line switches are employed, are mounted on the line switches in such a manner that their contacts will close and connect the tone to the "release lead" whenever the plunger is engaged with its associated bank, but will not be closed when only the B.C.O. armature of the line switch is operated.

On plunger type line switchboards the method used to make it possible to connect any line to any tone is to provide a separate set of terminal strips in the regular terminal assembly to which the various tones are connected, a set of terminal strips to which are connected the tone condenser wires, and a terminal strip to which is connected a lead from one of the extra pair of springs provided with the line switches. The other spring of the pair is connected to the release lead.

The terminal strips are so arranged that by soldering the proper terminals together, it is possible to connect any one of the release leads to a tone condenser, and any condenser to any of the four tones.

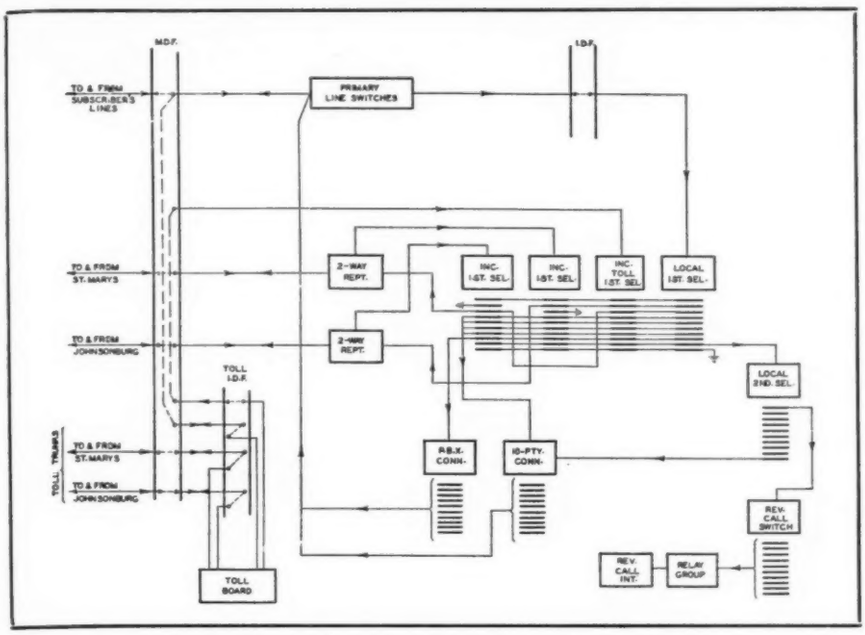
The terminal strip and the wiring for connecting to the extra springs are furnished as a part of the standard line switchboard, but neither the springs, condensers, tone terminal strips nor connecting cables are furnished unless specified, as these can be added at any time when required.

When the tones are provided on rotary type line switchboards, a similar arrangement of terminal strips, as previously described in connection with plunger type line switchboards, is employed, except that the extra springs are not required on the rotary line switches, the condenser terminals in this case being connected directly to the release lead, at the terminal assembly. None of the condenser terminal strips or cables are furnished as a part of the rotary type line switchboards, since they can be furnished and installed at any time.

The accompanying illustration shows the schematic circuit of the tone machine and also that of a plunger type line switch and the method employed to connect the various tones thereto.

A future article will include a brief circuit description of the recording trunks employed when "class of service" tone service is rendered.

This is No. 15 of a series of articles prepared by members of the Engineering Staff of Automatic Electric Inc., covering technical features of the Strowger Automatic Telephone System.



Switching Diagram for the Ridgway, Pa., Automatic Office

(*Continued from page* 24.)

installation from an engineering standpoint, many other operating telephone men from neighboring exchanges were present, among them being E. D. Schade, general manager, Johnstown Telephone Co., Johnstown, Pa., Arthur O. Black, general manager of the People's Telephone Corp., of Butler, Pa., G. W. De Long, L. E. Whiting, Roy F. Mapes, associated with the Jamestown Telephone Corp., Jamestown, N. Y. In addition to these a number of representatives of the Pittsburgh division of the Bell Telephone Co. of Pennsylvania were present.

Automatic Electric Inc. was represented by E. R. Girard, who was in charge of the installation force; T. C. Thompson, general superintendent; W. H. Perkins, installation department; and R. H. Burfeind and H. S. Williams, sales department.

The engineering features of these installations are sufficiently interesting to justify brief comment. The accompanying diagram shows the relative size and geographical position of the three exchange areas. Each automatic exchange is capable of handling calls within its own boundaries without trunking through the other offices.

At Ridgway there has been established a centralized point for the handling of all calls requiring the services of an operator. The automatic switchboard at Ridgway is connected to both the St. Mary's and Johnsonburg switchboards by means of two-way trunks, so that calls between subscribers in different cities are handled through the automatic switches in exactly the same way as if these exchanges were telephone offices in the same city. In other words, the entire chain of exchanges is treated as a free service network, with no extra charge for intercity calls.

Toll calls for the adjacent communities of Dubois, Brockway, Kane and other points are being handled through a six-position toll switchboard located in the Ridgway office. The toll toperator has direct access to toll first selectors at Ridgway, which in turn provide outlets over the local trunks through St. Mary's and Johnsonburg as well as to the Ridgway subscribers. This can be readily understood by referring to the accompanying switching diagram for the Ridgway office.

The initial installation at Ridgway consists of 700 lines which are divided into P.B.X. lines and ten-party lines. Party-line switches are arranged for harmonic ringing and any number of stations from one to ten may be placed on each line with full selective ringing.

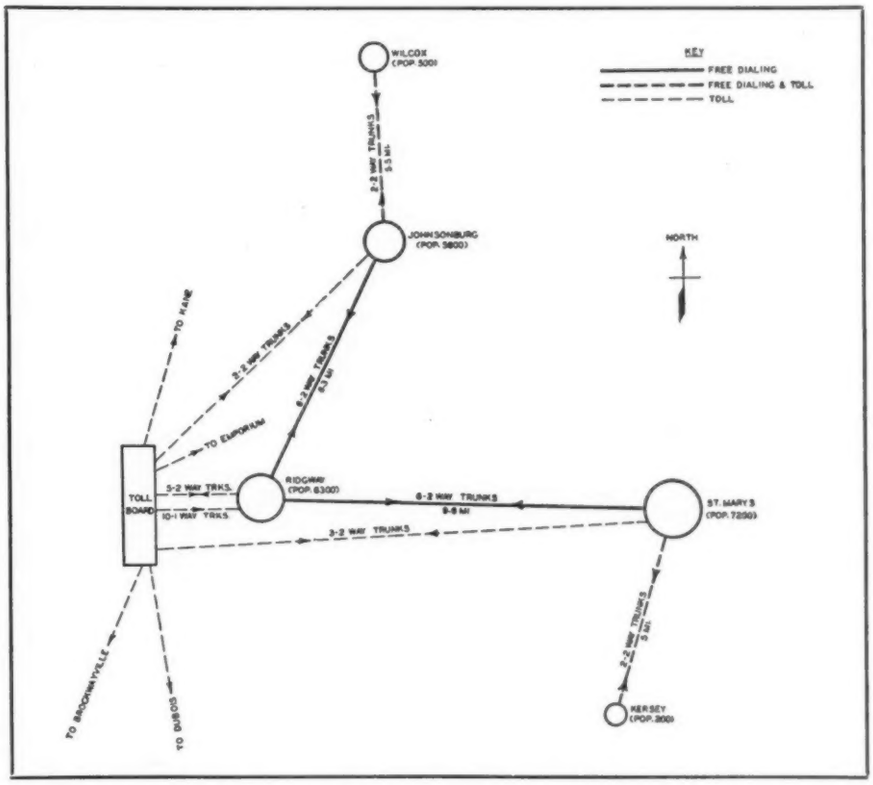
The primary line switches are of the plunger type arranged to mount 200 per unit, while the connectors and selectors are arranged on separate frames. Ten trunks are taken from each of the 75-line switches by linking together three groups of 25 and serving them with one master switch.

In the power plant the battery consists of 23 regular cells and three end cells. The charging machine is of the Rochester Electric Products Corp.'s manufacture and consists of one divertor pole generator direct-connected to an induction motor.

The switching equipments at St. Mary's and Johnsonburg are very similar to that of Ridgway except as to capacity, the initial installation at St. Mary's being 500 lines and at Johnsonburg 350.

Mr. Wright, as president of the new Home Telephone Co., is greatly to be congratulated on the success of this, his latest venture. Comments on the automatic service during the days following the cutover were more than favorable—they were enthusiastic, and there is every reason to believe that the telephone users of these towns are thoroughly satisfied.

A universal directory has been issued that covers the five cities in which the Home Telephone Co. operates, three of which are automatic. Toll dialing instructions are placed at the tops and bottoms of pages so as to keep the proper code numbers in front of subscribers.



The Automatic Toll Network of the Home Telephone Co., Ridgway, Pa.

Automatic Telephone Fundamentals

This Is One of Series of Articles Explaining in Simple Terms the Mechanical and Electrical Basis of the Strowger Automatic Telephone System, Which Appear Weekly — Part 16, Relays; Current, Coil Connections and Speed of Action

By Arthur Bessey Smith, Ph. D.

Sufficient reason for the present treatment of relays is to be found in the general interest in them among telephone men, and the particular uses to which they are put in connection with automatic switching.

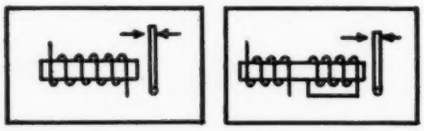


Fig. 57. Simple Telephone Relay.—Fig. 58. Form of D. C. Relay Which Will Not Respond to A. C.

There are tremendous resources at our disposal in the varied forms of relays. There is not space to discuss fully all the characteristics of all the classes, but we will explain those most used in automatic work.

A relay is a device by means of which current in one circuit controls circuits, or currents in circuits. The best known example is found in the ordinary relay, Fig. 57, which consists of an electromagnet, an armature, and two or more contacts.

A less familiar example is the telephone repeater, which may be symbolized, Fig. 59, by a receiver placed against the mouthpiece of a transmitter. Alternating current, passed through the receiver, will cause the diaphragm to vibrate. This will actuate the diaphragm of the transmitter, varying the primary current and inducing an alternating voltage in the secondary of the induction coil.

That member (usually a spring) which may make contact with one or two other

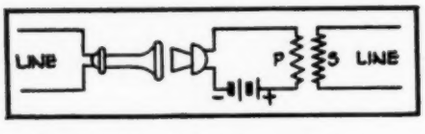


Fig. 59. Simple Telephone Repeater.

contacts of springs is usually termed the "main spring," and is most frequently operated directly by the armature.

The contact against which the main spring normally rests is termed the "back contact," while that which the main spring touches when the relay coil is energized is called the "front contact" of the relay.

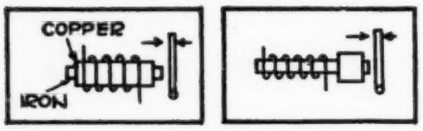


Fig. 60. D. C. Relay with Copper Sleeve.—Fig. 61. D. C. Relay with Copper Ring.

Relays may be classified in several ways, as follows:

1. Operating current.
2. Circuit connections of coils.
3. Restoring force for armature.
4. Form of core.
5. Speed of action.
6. Mode of operation.

Operating Current.

Relays may be classified as direct current, alternating current, and a combination of the two. Some relays need to respond to direct current and not to respond to alternating current. Others must not respond to direct current, but must respond to alternating. Finally, others, while primarily designed for alternating or for direct current, need not be specially guarded against operating upon the other kind of current.

To make a relay which will respond to direct current and not to alternating, we may use a two-winding relay, Fig. 58,

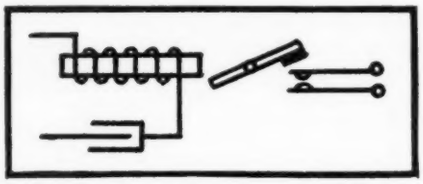


Fig. 62. Simple Form of A. C. Relay.

one winding being the active, the other being short-circuited upon itself.

When alternating current is passed through the active winding the alternating flux thereby created in the core generates an alternating current in the short-circuited winding. This current has such a relation to the primary current that it almost neutralizes its effects, the result being that not very much magnetism is created, at least not enough to move the armature.

The same effect can be secured by providing the core with a copper sleeve, Fig. 60. The copper sleeve is, in reality, a short-circuited winding consisting of one turn. Having very low resistance, the current flow is very large.

Still another form is that which employs a copper ring, Fig. 61, which occupies part of the winding space. When alternating current is passed through the active winding, eddy currents are generated in the copper mass and they very greatly neutralize the effect of the alternating current in the active winding.

A relay which will respond only to alternating current, usually has a heavy armature, Fig. 62, and a condenser in series

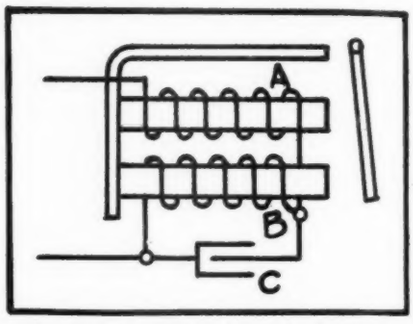


Fig. 63. The "Three-Leg" A. C. Relay.

with the winding to prevent the passage of direct current. The heavy armature has sufficient inertia to keep it in position during the time that the alternating current is reversing the magnetism of the core. The conversation repeater, shown in Fig. 59, is also an alternating current relay.

Ordinary relays, such as shown in Fig. 57, respond to both alternating and direct current. Alternating current will, however, cause the armature to vibrate or chatter. If the frequency be not too high, and the relay is especially constructed for rapid action, the armature will vibrate in unison with the current. The alternating current relay of Fig. 62 will respond to direct current if the condenser be omitted or short-circuited.

The three-leg relay, Fig. 63, is very positive on alternating current. The condenser, which is in parallel with winding *B*, throws the current of that winding out of phase with the current of winding *A*. Hence there is never a time when both *A* and *B* currents are zero; one or both are always pulling on the armature.

Fig. 64 shows two ways of connecting this relay. The series arrangement is suitable if a high impedance is desired. The parallel arrangement is good for low impedance, but requires more current to operate it.

We may arrange our relays in four

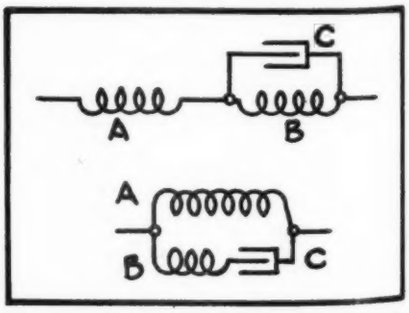


Fig. 64. Methods of Connecting "Three-Leg" Relay.

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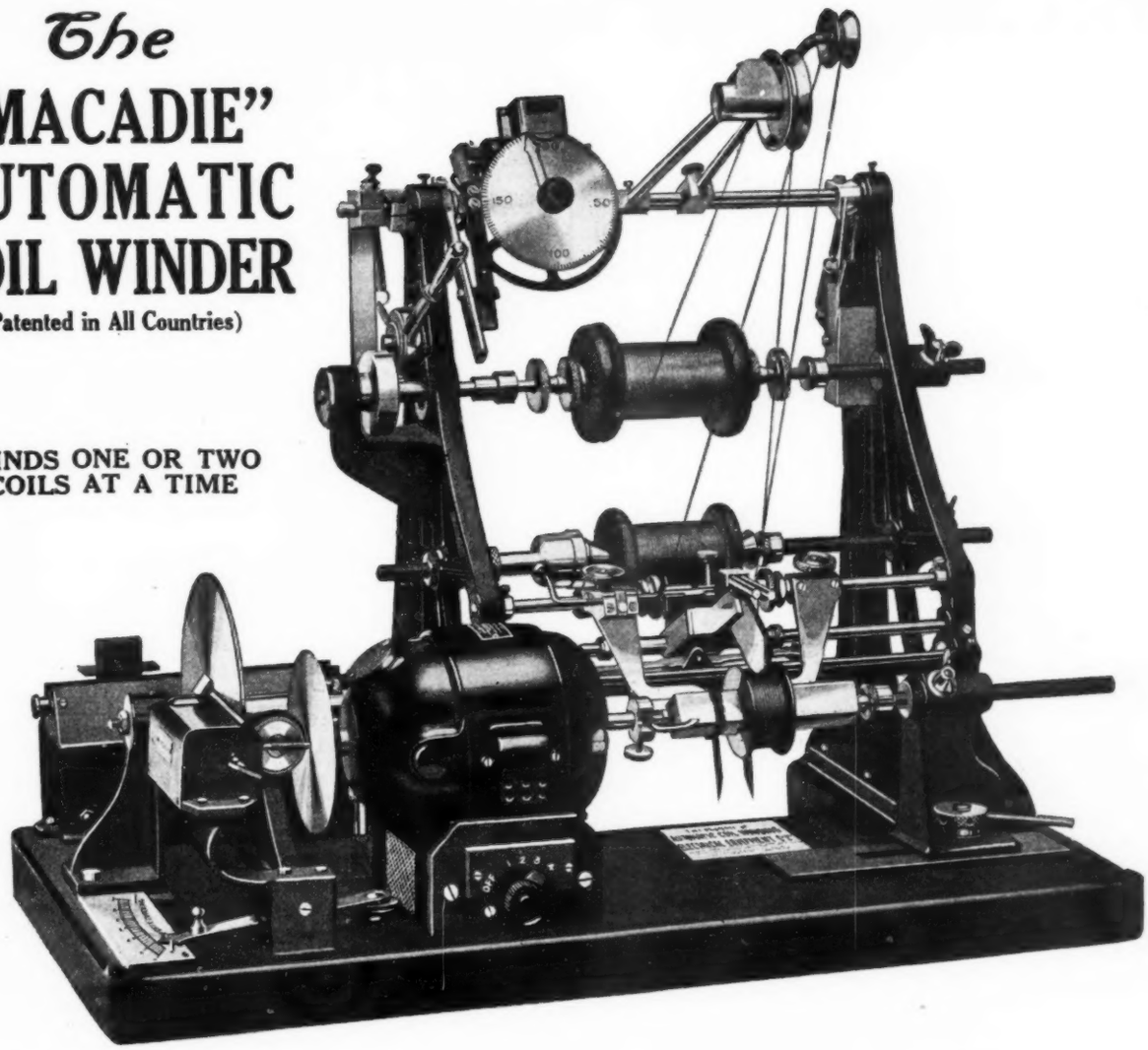

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classes: Parallel, series, two windings and differential.

Circuit Connections of Coils.

The relays intended to be operated in parallel require enough resistance, or impedance, to withstand the full electromotive force of the battery or generator. For 24-volt battery, in order to secure current economy, the 500-ohm relay is common. For 48-volt systems, relays are wound to 1,000 ohms, 1,300 ohms, and sometimes higher. Special heavy-duty relays are sometimes wound to 100 ohms or less.

The series relay is generally lower in resistance, because there may be several in the same circuit in series with each other. If two relays have equal work to do, they should have about equal resistance and equal turns. If one has little work to do, and the other has great work to do, the latter should have higher resistance and a greater number of turns.

Resistance alone is not always desirable. High resistance does not confer power upon a relay. It requires a large number of turns to do that. The relay measure is found in the product of the number of turns by the number of amperes which flow through them. A relay carrying 50 milli-amperes (0.050 ampere) and having 11,000 turns, has 550 ampere turns.

The high resistance is merely a result

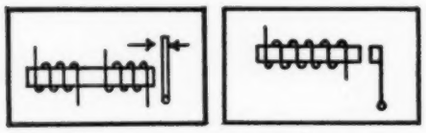


Fig. 65. A Simple Two-Winding Relay.—Fig. 67. The Single-Core Relay. Fig. 66. New Form of Differential Relay.

of the attempt to secure a large number of turns in a given space. The more turns we have, the smaller must be the wire; consequently the higher will be the resistance.

The two-winding relay, Fig. 65, may have both windings in the same circuit, as is found in the line relay of an automatic selector or connector. The division into two windings is merely for the purpose of balancing the circuit against noise, and has no benefit to operation under normal conditions. In some relays the two windings are in separate circuits.

The differential relay is a two-winding relay in which the current may flow in opposite directions at certain times. This may be used to prevent the relay from operating, although current may flow in both windings. The relay is somewhat marginal.

A new form of differential relay is shown in Fig. 66. The essential change from the customary relay is the addition of a front pole piece which forms a good magnetic path from the mid-point of the core to the side of the armature away from the regular core. Residual adjustments are provided for both poles.

When used as an electrically-polarized relay, *A* is the polarizing winding and *B* is the line coil. When the current in *B* circulates the same way around the core as that in *A*, the center pole becomes

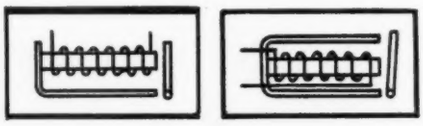


Fig. 68. Double-Core Relay with Consequent Pole.—Fig. 69. Shell Type Relay.

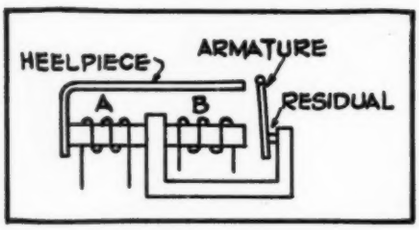
strongly magnetic, and the outer pole more or less neutral. The armature is strongly attracted.

If the current in *B* is reversed, the center pole weakens or reverses polarity, while the outer pole becomes very strong, pulling the armature out. This relay has a wide range of operation as to relative strengths of *A* and *B*.

Restoring Force.

Two forces are relied upon for restoring the armature to its final position—gravity and springs.

The former is not much used in telephone work, except for special cases. To secure strong action, the gravity relay re-



quires heavy weight in the armature. But weight involves inertia, so that the relay becomes slow to pull up and slow to fall back. This property is useful if such an action is desired, as in the alternating current relay of Fig. 62.

The relay with a spring-controlled armature is the most active and reliable for general purposes. If desired, the weight and inertia of the armature may be made very small, hence its action very quick.

Form of Core.

Relays may be classified as regards their cores, as follows: Single core, double core with consequent pole, shell type, double core with double coils, permanent magnet polarized type.

The single-core relay, Fig. 67, has no return path for the magnetism, except the air. It is relatively weak, but may be made exceedingly quick in action.

The double-core relay with consequent pole, Fig. 68, is compact, cheap and may be made satisfactory for quick action. The current flowing through the winding drives the nearest flux through the core upon which it is mounted. Most of this magnetism goes through the air into the armature and back through the return limb, sometimes known as the "heel piece." However, quite a large amount of the magnetism returns through the air.

The shell type, Fig. 69, is compact, more costly, has high impedance, but is not very quick in action. The magnetism generated by the coil on the central core passes through the central air gap into the armature, out to its edges, back through the shell which forms the return limb, to the other end of the core. There is little or no external magnetic leakage.

The double coil, or double-core relay, Fig. 70, is powerful and efficient, but costs more than the single-core relay. It is very largely used in telegraph work.

The polarized relay, Fig. 71, has two main parts, the electromagnet consisting of the two soft iron cores, yokes, or heel piece, and armature, and the permanent magnet which spans the two ends of the electromagnetic circuit. The armature may be pivoted at the center.

The essential feature, which will be found in all forms of this relay, is that the magnetic flux caused by the permanent steel magnet divides and passes through two parts of the soft iron electromagnet. The current passing through the winding diverts this magnetic flux from one air gap to another so as to cause the armature to move toward that side.

The two-winding relay may be used as a polarized relay by permanently energizing one of its windings with direct current. The action of the armature will then be dependent upon the direction taken by the current in the other winding.

Speed of Action.

Relays may be classified, with regard to speed of action into three groups, as follows:

The manual or ordinary.
Quick operating.
Quick releasing.
Quick acting (speedy operation and release).
Slow operating.
Slow releasing.
Slow acting (time delay on both operation and release.)

The manual relay may operate within any reasonable time and fall back under the same conditions. It is not essential that the relay shall respond in less than

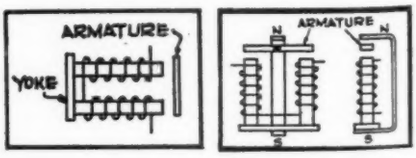
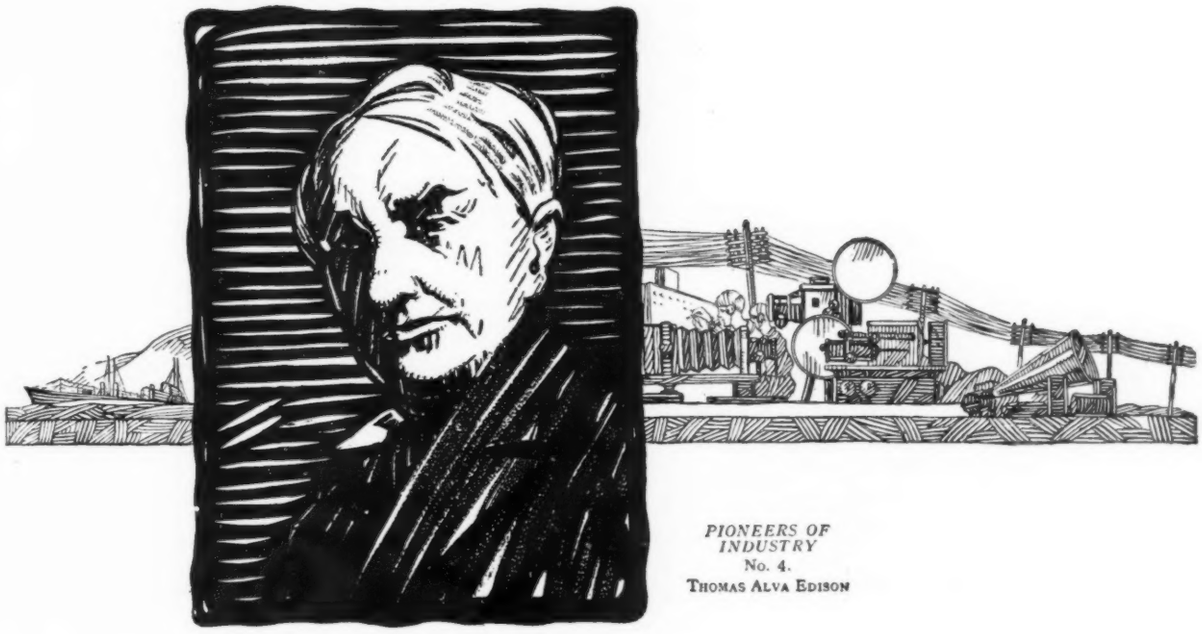


Fig. 70. Double Coil Relay.—Fig. 71. Polarized Relay.

one-fifth of a second, because nothing in particular depends upon an excessively quick action. Economy of current and positiveness of action are desired rather than speed.

Relays of the ordinary type are best



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tested by the employment of four values of current. Operating current is the lowest current which may be depended upon always to operate the relay. Non-operating current is the greatest current which will fall to operate the relay. Saturation current is that value which will thoroughly magnetize the core. Release current is the greatest current which may be flowing in the coil and allow the armature to fall back after having been energized.

The quick-acting relay must be very prompt to attract its armature and to release it after the current is cut off. Spring control is essential, also light weight of moving parts and negligible friction. It requires much more current to operate it at full speed than merely to pull it up. Relays of this type have been made

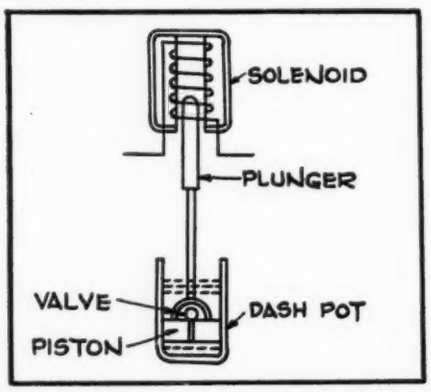

Fig. 72. Dashpot Relay (Slow in Operation).

to operate correctly as fast as 50 cycles per second.

There must be very few short-circuited turns in the winding, because they will have a tendency to make the release of the armature slow, as was described in connection with the relay of Fig. 58. The magnetic circuit must not be closed completely—that is, iron to iron—or else the residual magnetism will be so strong that the armature will be very slow to let go. There must be an air gap located somewhere in the circuit.

This air gap is familiarly known as the "residual." Since most relays have a solid iron core, there will be eddy currents generated in it every time the iron is magnetized and demagnetized. These eddy currents oppose the magnetization or demagnetization of the iron and, consequently, slow down the action of the relay. They have a greater effect upon large cores. This causes a small core to be used, in which the effect of eddy currents is not so marked.

A slow-acting relay is slow to operate and slow to release. But both properties are seldom needed in the same relay. In order to make a relay very slow in attraction, it is necessary to employ some retarding device like a dash pot, and to construct the relay with a relatively long stroke. (Fig. 72.)

In order to secure a quick release, the dash pot is arranged so that a small valve is opened whenever the piston starts to descend.

The most generally used slow-release relay is one which may attract its armature very quickly, but will be slow to let go. This is usually secured by one of the three forms shown in Figs. 58, 60 and 61, namely, short-circuited winding, copper sleeve over the core, or a copper collar. All of them depend upon the same principle—the eddy current generated in the short-circuited winding.

(To be continued.)

Chinese and Japanese Telephone and Radio Interests Confer.

Important decisions have been reached at a conference recently concluded in Mukden, Manchuria, capital of the three provinces controlled by Chang Tso-lin, between representatives of Chinese and Japanese telephone and radio interests, it is reported in Shanghai, China.

The first clause of the agreement provides for long distance telephone communication between the Japanese stations at Dairen, Port Arthur, Antung and Mukden. Chinese telephones in Japanese jurisdiction will not be permitted to make these long distance calls but will be permitted to receive messages.

The charges are to be at the rate of 30 sen gold (15 cents) for three minutes' conversation. A special office to facilitate inter-communications will be established in Mukden. The second clause provides for telephonic intercommunication between the native city of Mukden and the Japanese concession. The third clause deals with radio intercommunication, and makes arrangements whereby Mukden and Changchun are brought into the wireless service with Dairen and Harbin.

Lincoln, Neb., Company Planning Reconstruction Work.

An extensive construction and rebuilding program is being planned by the Lincoln Telephone & Telegraph Co. in Nebraska. Part of it has been started.

The action of the Nemaha River in southeastern Nebraska is encroaching upon river roads that are in little use since the state started building its graveled and graded roads, is forcing some relocation and rerouting of toll lines as well as local leads.

Heavier farm lines are to be constructed in several portions of the territory to meet the demand for better and more extensive service.

Press Pays Tribute to Home Telephone Co., of Wabash, Ind.

A striking example of how a well-managed Independent telephone company can win the good will of the community it serves was recently demonstrated at Wabash, Ind., where the Home Telephone Co. operates. An editorial in the Daily Plain Dealer, published at Wabash, entitled "Good Telephone Service," pays a fine tribute to the local company as follows:

"In the report of the Home Telephone Co. for 1926 it was stated that the net profits were less than the year before, although the number of calls—six and a half million—was the largest in the history of the company.

Wabash is particularly fortunate in having a home-owned, home-managed telephone company. Rates are lower than in most Indiana cities. Better still, from the telephone users' standpoint, the service is exceptionally good.

Under the management of W. H. Van Horn, who has been operating head for nine years, there has been gathered about him an exceptionally efficient force. The promptness with which calls are answered is taken as a matter of course, because Wabash telephone users are accustomed to nothing else.

Those who have occasion to use the telephones of other cities are the only ones, perhaps, who really appreciate how good the service is here. The 'hello' girls are courteous. They are quick in answering calls. Troublemen are prompt in making storm and other repairs.

It seldom happens that there are vexatious delays and indifference in serving patrons that is so maddening, especially when it is human nature to have a few seconds' delay on a telephone seem to be many minutes.

Offers recently have been made for the purchase of the Home company. For the good of Wabash it is to be hoped the exchange will remain a home-owned, home-operated concern.

Change in ownership will mean an inevitable raise in rates, for outsiders have not lived in this community for years as have Nelson G. Hunter, Henry G. Webber, H. E. Wallace, John Hipskind and other local stockholders, who are satisfied with reasonable profit.

As good citizens themselves they think more of keeping the good will of their fellow townsmen than would non-residents, who would be interested in Wabash only for what they could take out of it, and, therefore, would have no hesitancy in bearing down to collect all the law will allow, which, under the corporation-controlled utility board of Indiana, could easily be made much more than it is now."

The Wabash Home Telephone Co. is using the Kellogg service switchboard, and with excellent results.

Chicago Company Purchases Kansas Telephone System.

The General Telephone Co., of Chicago, has purchased the Galena Home Telephone Co., with exchanges in Galena, Baxter Springs, Columbus, Weir and Scammon, in Cherokee county, Kansas.

The General company has holdings in Illinois and Michigan. The Galena purchase is its first west of the Mississippi River.

Put a Good Overcoat on Your Product

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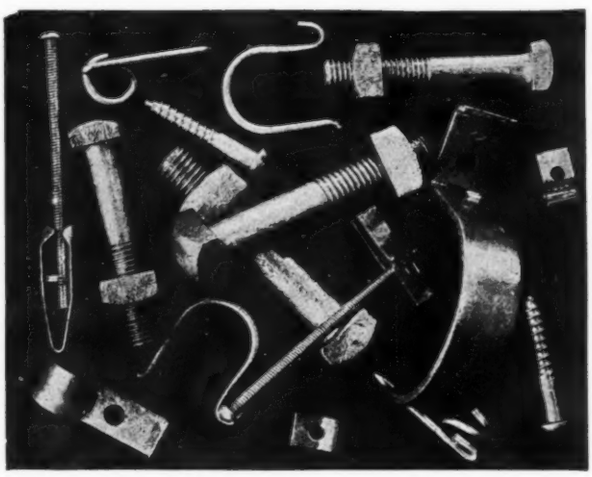
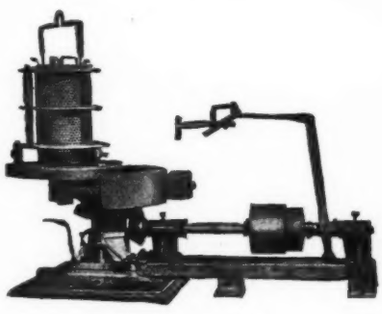


The material that you sell to the telephone industry deserves to be protected and beautified by the finest, latest and best galvanizing.—("Diamond.")

Heretofore it has been necessary to recut the threads of the nut, and in some cases the bolt, in order to get a good nut fit, now by the "Diamond" Process the threads on the bolt and nut are both galvanized without recutting and a fine, smooth nut fit obtained.

The vital part of a bolt is in its threads. Why remove the spelter by recutting the nut or the bolt and thus expose the vital part to corrosion?

THE "DIAMOND" PROCESS [PATENTED] IS AVAILABLE TO YOU



1—We should be glad to quote you on your galvanizing requirements.

2—We are in position to license you to galvanize by our process if you operate your own plant.

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DIAMOND EXPANSION BOLT CO.

Home Office and Factory, GARWOOD, N. J.

When writing to the Diamond Expansion Bolt Co., please mention TELEPHONY.

With the Manufacturers and Jobbers

Belleville, Kan., Exchange Has New Switchboard Equipment.

In the telephone exchange in Belleville, one of the most prosperous cities of northern Kansas, there has recently been installed a modern universal convertible switchboard in the company's new two-story brick exchange building, which is specially designed and constructed for telephone operation. The Belleville exchange of 900 subscribers is owned and operated by the United Telephone Co., of Abilene.

As the population of Belleville is approximately 2,500, telephone saturation has been practically reached with one telephone for every 2 7/9 persons. Credit is due C. C. Rynearson, local manager for the past seven years, for the remarkable development of the Belleville exchange.

The switchboard and central office equipment was furnished by American Electric Co., Inc., of Chicago. It is its latest unit-type steel-frame sectional cabinet arranged for one toll operator and three local operators. It is equipped with 700 local convertible associated lamp multiple line equipments for rural and toll lines.

Since the installation, over 400 local lines have been converted from magneto to common battery, and it is expected that the entire city exchange will be converted to common battery within a year.

The outstanding feature of this installation is the remarkable simplicity, positive operation and exceptional transmission efficiency of the switchboard circuits. The rugged construction, the excellent design of the apparatus and the accessible arrangement of the equipment have reduced operating and maintenance costs to a minimum. This new switchboard is giving to the telephone users of Belleville the high quality and efficient service they have the right to expect.

New Building of United Telephone Co. at Belleville, Kans.

Former Ford Chief Engineer Now in Consulting Work.

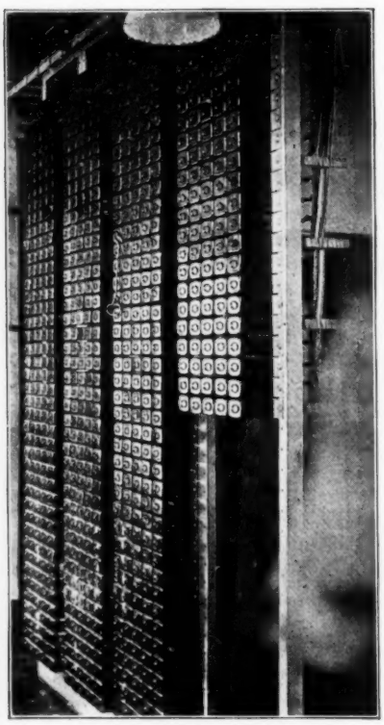
Fred Allison has resigned as chief electrical and mechanical engineer of the Ford Motor Co., and will now engage in consulting engineering work through H. R. Van Deventer, Inc., 342 Madison avenue, New York, N. Y. Mr. Allison has been connected with Henry Ford for over 20 years and his activities have included all the diverse branches of the Ford industries.

Some idea of the diversification of the engineering work handled by Mr. Allison will be apparent when it is considered that he supervised the installation of the systems for the production of Ford cars, building of electric locomotives for Ford's railroad, building of turbines at the Ford plants which are among the largest in the country, installing plant for the production of over 10,000 storage batteries a day, installation of systems for the mass handling of lumber and ores in the forests and mines owned by the Ford interests, installing complete plant for producing small electrical motors used by Ford, together with conveyor equipment and equipment for the numerous electrical, mechanical, manufacturing and transportation groups that go to make up the Ford industry.

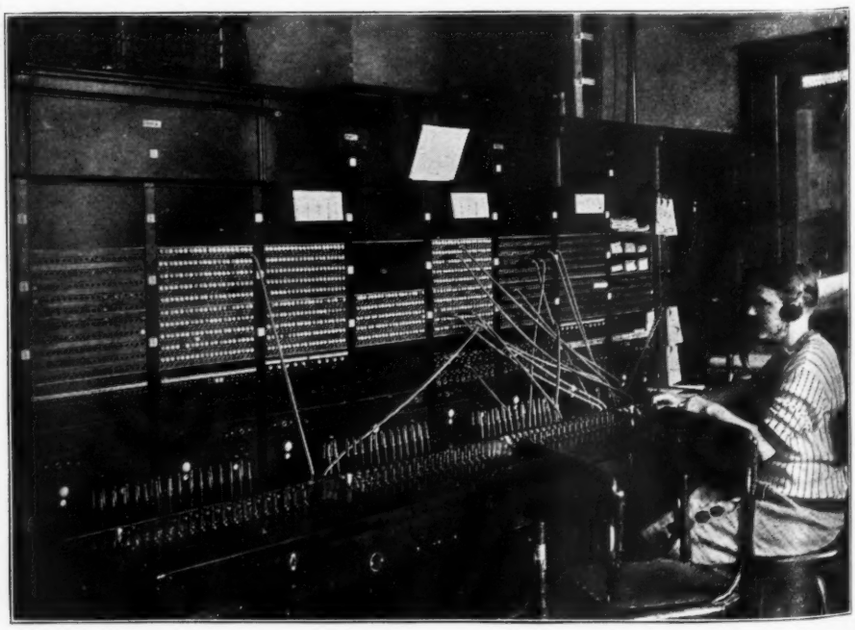
Mr. Allison has personally taken out a large number of patents covering not only many of the features in use in the Ford car but also many of the production methods used in its manufacture.

Huge sums have been spent on the development of many of Mr. Allison's process patents and these processes, fully worked out commercially, are in extended use in the Ford plant.

It is reported that not only will Mr. Allison's services be available to a limited number of manufacturers who wish to install the production methods originated by him but he is also in a position to grant licenses, under many of his patents, to manufacturers in a large number of industries to which these patents may apply.



Relay Racks in Belleville, Kans.



Four-Position Monarch Type Universal Convertible Switchboard at Belleville, Kans.

Line material, too

Insulators — clamps — rubber gloves. Everything else from the top of the pole to the bottom of the hole—Graybar brings them within arm's reach.

But that's not all. Consider the greater Graybar story—60,000 quality supplies—58 years of experience behind them — 59 distributing houses to give them to you quickly.

Graybar brings 60,000 electrical supplies within arm's reach

Offices in 59 Principal Cities
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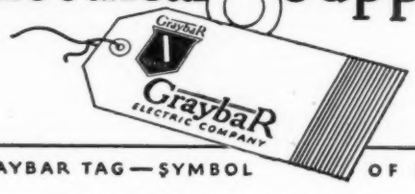
Successor to Western Electric Supply Dept.

Electrical Supplies



THE GRAYBAR TAG—SYMBOL OF DISTRIBUTION

When writing to Graybar Electric Co., please mention TELEPHONY

The Annual Staff Dinner of Automatic Telephone Mfg. Co., Liverpool, England, Was Attended by About 160 Executives and Engineers from Liverpool and London Offices.

There are few men in the world who have had the training and experience of Mr. Allison, and the introduction of his methods, so successfully developed in connection with mass production of automobiles, into other lines of industry, such as radio, iceless refrigeration machines and other new devices adapted to mass production will be awaited with interest.

A Coffee-Tin Telephone Receiver That Worked.

In proposing "The Company" at the fourth annual staff dinner of the Automatic Telephone Mfg. Co. Ltd., Dane Sinclair, who presided, made some interesting references to the pioneer days of telephony with which he was intimately associated.

He described how, many years ago, in Japan, he constructed a crude receiver from a coffee tin and a magnet taken from a telegraph instrument. The magnet and coil were positioned by a packing of sweet potatoes, the lid of the tin serving as a diaphragm. With this primitive replica of Bell's historic invention, speech was successfully transmitted.

Some 160 members of the company's Liverpool and London staffs attended this function, which was held at the Exchange Hotel, Liverpool, on Friday, March 18.

Sir Max Muspratt, Bt., responded to the toast of the evening, and an enjoyable musical program was subsequently rendered under the personal direction of Tilston Roberts.

Prices in the Metal Market.

New York, April 11—Copper—Steady; electrolytic spot and futures, 13c. Tin—Easy; spot and nearby, $68; June, $66.50. Iron—Firm; No. 2, f.o.b. eastern Pennsylvania, $21@21.50; No. 2 f.o.b. Buffalo, $17.75@18; No. 2 f.o.b. Alabama, $18. Lead—Steady; spot, 7.25c. Zinc—Easy; East St. Louis spot and futures, 6.40c. Antimony—Spot, 14.50c.

What the Commissions Are Doing

Up-to-the-Minute News Regarding the Activities of State and Interstate Commissions, Courts and City Councils in Matters Concerning Telephone Companies—Summary of Commission Orders and Schedule of Telephone Hearings

Applies for Authority to Purchase California Toll Lines.

The Reedley Telephone Co. has made application to the California Railroad Commission for authority to purchase, and the trustees of General Grant Park Telephone Co. for permission to sell the telephone lines between Dinuba and Garvin's Camp, Badger, General Grant National Park and Wilsonia. It is proposed by Reedley Telephone Co., upon acquiring the lines, to disconnect the General Grant Park company's lines at a point known as Mira Monte, and connect therewith the present line of the Reedley company, thus rendering service to the National Park, Wilsonia, Badger and Garvin's Camp via Reedley instead of via Dinuba.

The price to be paid for the lines is $3,000 in 7 per cent bonds of the Reedley Telephone Co. The Reedley Telephone Co. also requests authority to establish "another line" charge of 75 cents for three minutes' conversation between Reedley and General Grant National Park or Wilsonia.

Ashburn, Ga., Telephone Rate Cut Ordered by Commission.

A downward revision of rates of the Ashburn Telephone Co., of Ashburn and Sycamore, was ordered recently by the Georgia Public Service Commission because of alleged unsatisfactory service by the company to its subscribers.

The order, in effect, rescinds the action of the commission in granting an increase in rates September 14, 1926, "predicated upon the company making such improvements to its plant as in the opinion of the commission were necessary to enable the Ashburn Telephone Co. to perform efficient telephone service." The commission says the company failed to make the necessary improvements.

The new rate schedule follows:

Business single line station, $2 per month.
Business duplex line station, $1.50 per month.
Business extension line station, 50 cents per month.
Residence single line station, $1 per month.
Residence duplex line station, 75 cents per month.
Residence extension line station, 50 cents per month.

Terre Haute, Ind., Company Authorized to Issue Stock.

The Indiana Public Service Commission on April 1 granted the Citizens Independ-

ent Telephone Co., Terre Haute, permission to issue $343,000 in preferred stock in order that it may put in a new automatic central office and other improvements, the total cost of which is to be $876,564.84.

The remainder of the amount is to be made up from the sale of $150,000 in marketable securities, $100,000 now in the bank, sale of real estate valued at about $100,000 and from other sources.

Michigan Commission Authorizes Company to Issue Stock.

Articles of incorporation for a new telephone company in Michigan have been filed with the secretary of state as the result of the granting March 30 by the Michigan Public Utilities Commission of authority to the Michigan Associated Telephone Co. a Delaware corporation, to issue capital stock of $50,000 and first mortgage gold bonds to the amount of $100,000.

The Michigan company will purchase at a price of $123,000 the three Independent companies located at Blissfield, Reading and Tecumseh, which are in the southeastern part of the state.

Minnesota Commission Authorizes Rate Increase at Fisher.

The Minnesota Railroad & Warehouse Commission on April 6 authorized the Fisher Cooperative Telephone Co., Fisher, to change its schedule of rates. The old monthly rates with the new rates effective on May 1, are:

	Old	New
Individual line, business	$2.50	$3.50
Individual line, residence	1.50	1.80
Business extension		1.00
Residence extension		.50
Rural switching, yearly	3.00	3.00

The Fisher company operates a local exchange at Fisher serving approximately 44 town stations and performing a switching service for four rural stations.

During the first part of January, 1924, the company entered into an agreement with the Northwestern Bell Telephone Co. for connection with the Grand Forks, N. D., exchange at the regular switching rate of $7.20 per year, per telephone.

This connection was necessary in order to obtain communication with the Bygland Rural Telephone Co., an organization operating approximately 71 telephones in the rural district adjacent to Fisher. The lines of this company are connected with the Grand Forks exchange on a switching basis.

The Fisher Cooperative Telephone Co. also leased a wire extending from Fisher, Minn., to Grand Forks, N. D., from the Bygland Rural Telephone Co. at an annual charge of $50 per year.

In order to meet the additional cost of the Grand Forks connection, the Fisher company on January 23, 1924, passed a resolution assessing all members and nonmembers an additional monthly charge of $1 for business telephones and 30 cents for residence telephones. The records show that all subscribers favored this additional charge.

Upon review of the facts, the commission found that the rates on file are not fair and reasonable and that the petitioned rates were fair and reasonable.

Continue Rates Indefinitely Upon Showing of Their Effect.

The Nebraska State Railway Commission has indefinitely continued, in a supplemental finding, the rates previously established for the Blue Hill district of the Glenwood Telephone Company, a loose organization of a number of farm line companies owned by farmers. The original rates were put in contingent upon the company using the accounting system of the commission, which it had been reluctant to do.

The report of the company shows an operating revenue of $6,590.62. Maintenance and depreciation was $2,772.21, traffic $1,908.98, and commercial, $1,008.24, making a total of $5,689.43 expenses, leaving for dividends, after taxes and interest were paid, $875.04. The experience of the company showed that it is necessary to increase the maintenance account $500.

The property account of the company is $23,158.68, against which a depreciation reserve is set up of $7,782.17, which leaves a net property in excess of $15,000.

Spring housecleaning at your exchange

WHEN the spring housecleaning takes place in the exchanges as well as in the homes, there are going to be a lot of Runzel-Lenz cord users again impressed with the fact that the durability of these cords is greatly above the average.

RUNZEL-LENZ cords serve with such complete freedom from trouble, repairs and replacements that they run the risk of being "out of sight; out of mind." But not with the careful and experienced manager. He knows that these superior cords are always on the job, saving money and serving many calls long past the life of the ordinarily good cord.

INVESTIGATE Runzel-Lenz cords —their method of manufacture and their service records. Then you'll standardize on them.

RUNZEL-LENZ ELECTRIC MFG. CO.

1751 North Western Ave. CHICAGO, ILL.

The commission finds that it is clear that the true profits are not in excess of a fair return upon the fair value of the property. All expenses are reasonable and reflect economical management, and justify the continuance of existing rates until further order of the commission.

Rate and Stock Increases Authorized Because of Improvements.

The Nebraska State Railway Commission has granted a rate increase and a capital stock increase to the Lawrence Telephone Co. It recently converted the town portion of the exchange from grounded to metallic circuits, completely rebuilding that portion. The $3,000 stock issue asked for was to retire the indebtedness incurred in this work, which cost over $6,000.

The original construction cost of the property was $42,408, and a recent engineering estimate by the department found the present value to be $26,919. Against gross assets of $44,289, the company has had outstanding $15,000 stock and notes payable of $4,500. The commission says the new stock is reasonably necessary for corporate purposes.

No objection was entered by subscribers to the increased rates because of the better service given by the new construction. The net rates granted are: Individual business, $2.40; two-party business, $1.90; individual residence, $1.50; two-party residence, $1.25.

The accounts of the company showed total operating revenues for the past year to be $6,289.23, with expenses, including $2,800 for maintenance and depreciation, of $6,550.59, leaving only $278.84 for net, without any payment for dividends or interest. The new rates will add about $1,048 to the year's revenues.

As the company will have an outstanding stock issue of $18,000, dividends at 8 per cent will absorb practically all of the net revenue under the proposed rates. These are held not to be high, when compared to exchanges of like size. Permission to add 25 cents a month to each rate where payment is not made by the 10th of the current month is given.

The company now charges subscribers served at Mt. Clare $2.25 for business service and $1.25 for residence service. It desired to quote a gross rate of 25 cents a month more for each service, and the commission says that as the gross and net rate system stimulates prompt payment and is not intended to increase revenue, the differential is approved. The company serves 377 subscribers.

New Construction a Problem in Depreciating Accounting.

The legal department of the Northwestern Bell Telephone Co. has informally taken up with the Nebraska State Railway Commission the matter of handling new construction accounts during the spring and summer and up until the time in September when the new depreciation rules of the Interstate Commerce Commission become effective.

These provide, generally, for a depreciation set-up under the straight-line method; but for weeks the telephone company's legal department has been seeking interpretations of the rule, which must be considerably amplified before it can be applied in order to solve the various problems arising out of reconstruction.

Mr. Randall, chief of the Northwestern Bell's legal department, said that the company has a large improvement program for the year, involving the substitution, in a number of cases, of common battery service. The program includes putting in 21 large and 33 small manual switchboard sections, 131 private branch exchange boards, 15,800 lines of machine switching equipment, 51,000 telephone sets, many miles of cable and many terminals.

Chairman Taylor of the state railway commission has assured the company that it will not pre-judge the depreciation question, but will wait until the Interstate Commerce commission makes its final order in the matter. This will permit the company to go ahead with the assurance that the set-up will receive proper recognition.

Asks Nebraska Commission for Stock Issue Authorization.

The Lincoln Telephone & Telegraph Co. has applied to the Nebraska State Railway Commission for authority to issue $3,000,000 of 6 per cent preferred class A voting stock, which it proposes to offer for sale in its territory in pursuance of its plans of wide customer ownership.

The company has an authorized capital of 23 millions, of which 10 millions is common, 10 millions preferred class A stock and three millions of a special issue of non-voting securities.

Hollis, Okla., Telephone Co. Given a Rate Increase.

The Oklahoma Corporation Commission has granted an increase in rates to the Hollis Telephone Co. of Hollis, J. N. Bryant, proprietor. Several representative business men and citizens of Hollis agreed that if the owner of the property would install new equipment in the exchange, they would not object to a rate of $4 for business telephones and $2.50 for residence telephones.

The company since its organization had been operating a magneto exchange. During 1926 up-to-date common battery equipment was installed affecting the 407 telephones within the exchange area. The commission authorized the following new schedule of rates effective April 1:

Residence, wall or desk set optional, $2.25 per month; business, wall or desk set optional, $3.75 per month. The old rates for the residence telephones were $2 for wall set, for desk set $2.25; business telephones, $3.25 for wall set and $3.50 for desk set.

The new rates are temporary, to be effective for 12 months after effective date of the order.

Midland Company, Moab, Utah, Rate Increase Unopposed.

The rate increase applied for by the Midland Telephone Co. at a hearing held by the Utah Public Utilities Commission at Moab on March 24, was not opposed. J. W. Corbin, president of the company, and E. C. Merrill, secretary, as well as Orson J. Hyde of the Mountain States Telephone & Telegraph Co., testified that the increase was justifiable.

The Midland company testified that to meet the requirements of the Moab territory it had recently expended $3,500 in improvements, which included the installation of metallic lines. The company plans to put on a 24-hour service instead of the 15-hour service now given. The increase in rates is approximately 25 per cent.

Gallup, N. M., Properties Sold to Mountain States Company.

A certificate was issued March 23 by the Interstate Commerce Commission that the acquisition by the Mountain States Telephone & Telegraph Co. of the properties of the Gallup Telephone Co., Gallup, N. M., would be of advantage and in the public interest. No objection to the granting of the application was presented.

Gallup is a town of approximately 5,000 population. It is in the center of a large coal field and is the trading and shipping point for the surrounding territory. Recently the town has had a rapid growth, with a corresponding demand for increased and improved telephone service.

The major part of the Gallup company's plant was built 20 years ago. The company had not provided proper maintenance, nor had it supplied the additional equipment necessary to meet the growth of the town and surrounding territory.

The exchange, which served as of November 15, 1926, approximately 460 subscriber stations, connected with the Bell long distance lines, but the toll service was unsatisfactory, owing to the poor condition of the local plant.

By a contract made November 15, 1926, the Bell company agreed to purchase the telephone properties of the Gallup company for $45,626.19, payable in cash. In addition to the telephone properties, the Bell company is to purchase from the Gallup company a piece of real estate located in Gallup for $4,500. An appraisal made by engineers of the Bell company found the reproduction cost new of the telephone properties to be $33,270.05, and less depreciation, $13,999.26.

The properties are carried on the balance sheet of the Gallup company, as of December 31, 1925, at $44,174.11, with a depreciation reserve of $18,741.76. The esti-

mated value of property to be retired from service is $13,494.97. The cost of removing the useless property is expected to total $2,921.17, and the salvage from it is estimated at $4,347.38.

The Bell company further agreed to cancel an indebtedness of $700 owing to it by the Gallup company for engineering service performed in its behalf.

Preparations are under way by the Bell company to extend its long distance line westerly from Gallup to Winslow, Ariz. It appears that the acquisition will result in improved service generally throughout the territory.

Upon rebuilding the exchange, the Bell company will establish party-line service, both business and residence, in addition to the present single line service. The necessary changes in the exchange rate schedule will then be made, subject to the approval of the New Mexico Corporation Commission.

Increased Rates for Desk Telephone Allowed at Bangor.

The Bangor Telephone Co., Bangor, has been authorized by the Wisconsin Railroad Commission to increase its rates for desk telephones and for metallic circuits. This schedule became effective April 1:

Desk Telephone Differential:

(1) In rural service with desk telephone equipment the rate shall be 25 cents per month in excess of the corresponding rate for service with wall telephone equipment.

(2) In urban service with desk telephone equipment, the rate shall be 15 cents per month in excess of the corresponding rate for service with wall telephone equipment.

Metallic Circuit Differential:

For either rural or urban service over completely metallic circuits the rate shall be 25 cents per month in excess of the corresponding rate for service on grounded return circuits.

The fact that desk telephone service is more expensive to the utility than wall telephone service is generally recognized. However, it appeared illogical to the commission to establish the same differential for both urban and rural service, since repairs (the major element in the increased cost of desk telephone service) are more expensive when the telephone is remote from the central office.

A differential of 25 cents a month for rural desk telephone is permissible, the commissioners believed, but they were of the opinion that a differential of 15 cents a month would be adequate for urban service.

Because the desk telephone has come to be regarded as standard equipment for business use, the commission inclined to the belief that no differential should be allowed in this class of service, and that telephone utilities should establish rates for business service in contemplation of the widespread employment of the desk telephone.

However, it appeared to be the intent of the Bangor Telephone Co. to request a general revision of its entire rate structure as soon as circumstances permit, and the company asked that the commission permit the application of the desk telephone differential rate to residences and business subscribers alike until such time as a general review of the company's rates is made.

This provision the commission was disposed to allow, with the understanding that, insofar as business service is concerned, the arrangement would be of a temporary nature, and particularly because the basic rate schedule is moderate.

Summary of Commission Rulings and Schedule of Hearings.

INTERSTATE COMMERCE COMMISSION.

April 8: Hearing before Examiner Davis on joint application of the Consolidated Telephone Co., Bad Axe, Mich., and the Michigan Bell Telephone Co. for a certificate that the acquistion by the latter company of the properties of the former company will be of advantage to the persons to whom service is to be rendered and in the public interest.

April 8: Hearing before Examiner Davis on the joint application of James Thompson, doing business as the Seminole Telephone Co., Seminole, Okla., and the Southwestern Bell Telephone Co. for a certificate that the acquisition by the latter company of certain properties of James Thompson will be of advantage to the persons to whom service is to be rendered and in the public interest.

CALIFORNIA.

April 5: On the application of the Pomona Valley Telephone & Telegraph Union, Pomona, for permission to issue $100,000 par value of common capital stock, the commission authorized that company to issue $66,040 of such stock, and dismissed without prejudice the application so far as it involves $33,960 of such stock.

April 5: Joint application filed by Reedley Telephone Co. for permission to purchase, and trustees of General Grant Park Telephone Co. to sell, the telephone lines between Dinuba and Garvin's Camp, Badger, General Grant National Park and Wilsonia.

GEORGIA.

March 23: Ashburn Telephone Co., Ashburn, ordered to cut its rates because of alleged unsatisfactory service by the company to subscribers.

ILLINOIS.

April 13: Hearing at Chicago before Commissioner Wright in the matter of the proposed advance in rates for service in Park Ridge and Des Plaines stated in rate schedules Ill. C. C. 3 rendered by the Des Plaines Telephone Co.

April 13: Hearing at Chicago before Commissioner Kuhn on the citation of the commission against the Belvidere Telephone Co., Belvidere, to show cause for failure to reconstruct and restore service over the Belvidere-Cherry Valley lines.

April 14: Hearing before Chairman Jackson at Chicago in the matter of joint application for approval of purchase by Central Illinois Telephone Co., and sale by the Waverly Telephone Co., Pawnee Telephone Co., Divernon Telephone Co., and

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Sangamon County Electric & Telephone Co. of their telephone properties situated in the city of Waverly and villages of Franklin, Loami, Chatham, Divernon, and Pawnee and vicinities respectively, also for a certificate of convenience and necessity to the Central Illinois Telephone Co. to operate this property also, for authority to execute mortgage or trust deed and to issue its first mortgage series a 6 per cent gold bonds of $175,000 and to issue 1,000 shares of its common capital stock.

INDIANA.

March 30: Joint petition of the Osgood Telephone Co., Osgood, the Batesville Telephone Co., Batesville, and the Versailles Telephone Co., Versailles, for elimination of free inter-exchange service denied.

April 1: Petition of the Decatur County Telephone Co., Greensburg, for authority to increase its rates denied.

April 1: Permission granted the Citizens Independent Telephone Co., Terre Haute, to issue $343,000 in preferred stock in order that it may put in a new automatic central office and other improvements.

MICHIGAN.

March 30: Michigan Associated Telephone Co. authorized to issue capital stock of $50,000 and first mortgage gold bonds to the amount of $100,000 for the purchase at a price of $123,000 of three Independent companies, located at Blissfield, Reading and Tecumseh, which will be merged to form the new company.

April 7: Hearing on petition of Dansville Telephone Co., Dansville, for authority to increase its schedule of rates.

MINNESOTA.

April 6: Fisher Cooperative Telephone Co., Fisher, authorized to change its schedule of rates, effective May 1.

April 9: Mankato Citizen's Telephone Co., Mankato, authorized to change its schedule of rates, effective May 1.

NEBRASKA.

April 4: In the matter of the application of the Nuckolls County Independent Telephone Co., of Nelson, for authority to issue $15,000 additional stock for the purpose of purchasing the Hardy Telephone Co. and to defray the costs of reconstruction of the latter plant; found the

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stock reasonably necessary for corporate purposes, and issuance authorized; found that depreciation reserve is not excessive, and refuses the request to reduced present yearly requirement of $7,200.

April 4: Application of the Farmers' Independent Telephone Co., of Red Cloud, for permission to abandon certain farm line connection, denied, with proviso that if number of patrons thereon fails to reach eight during the year, the company may abandon line.

April 5: Hearing held on application of the Lincoln Telephone & Telegraph Co. for permission to issue $3,000,000 Class A preferred 6 per cent stock, to provide funds for future development; no one appeared in opposition; evidence adduced and cause taken under advisement.

April 6: Application of the McGuire Telephone Co. for permission to make a rural service annual rate of $10 a year and a 25-cent charge for tolls between Purdum and Halsey, found to be reasonable and granted.

April 6: It appearing to the commission that an unsatisfactory service condition exists in southwestern Nebraska affecting telephone service in the town of Farnam, Orafino, Eustis, Arapahoe, Holbrook, Cambridge, Bartley, Indianola, Stockville, Curtis and Moorefield, due to excessive use of free service given by sundry companies, it is ordered that a hearing be held at Cambridge May 11, at which the general public is invited and each company interested asked to send a representative.

April 7: In the matter of the application of the Whitney Telephone Co. for authority to charge and collect for four-party residence service $2 per month, subject to a 25-cent discount if payment is made before the 15th day of the current month billed; it appearing to the commission that the full capacity of the switchboard is now in use, it is necessary to establish this rate. While high in comparison with other exchanges, it is not unreasonable in comparison with other rates previously allowed for this exchange; ordered that application be granted.

OKLAHOMA.

April 5: Hollis Telephone Co., Hollis, given permission to increase its rates.

April 14: Hearing at Fairfax on complaint of city of Fairfax alleging inadequate telephone service.

UTAH.

March 24: Application granted of the Midland Telephone Co., Moab, for an increase of approximately 25 per cent.

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